'ANALAR' STANDARDS

for

LABORATORY CHEMICALS

Formulated and issued jointly by THE BRITISH DRUG HOUSES LTD.

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HOPKIN & WILLIAMS LTD.

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NOTE

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'AnalaR' chemicals independently

PREFACE TO THE FOURTH EDITION

For the present edition the book of 'AnalaR' standards has undergone the createst enlargement and the most thorough revision since its first publication in 1034 Specifications for fifty-eight new 'AnalaR' chemicals are included Some of these constitute simply an extension of the existing range while others have been selected in accordance with two definite objectives. In the first place it was considered desirable to introduce a fairly liberal selection of organic chemical reagents which fall generally into two sub classifications—(a) reagents for inorganic analysis, including the detection and determination by gravimetric colorimetric or other means of both metals and acid radicals, and (b) reagents for the identification of organic substances by the formation of derivatives of definite meltingpoints It has been shown repeatedly that impure reagents, particularly in class (a), can give rise to errors and difficulties altogether out of proportion to the actual amount of impurity present, and the need for a definite standard of purity is well established. In the second place it was considered that a useful purpose would be served if the 'AnalaR' range were made to include at least one compound of each of the more common elements, the range having been rather restricted, hitherto, from this point of view. This policy has been put into effect so far as seems reasonable and so far as suitable compounds can be made available. The items that have served for the introduction of additional elements are marked with an asterisk in the list of additions that follows

Ammonium bromide Digitonin Ammonum dichromate Dioxan Ammonium formate 3 5-Dinitrobenzoyl chloride Renzaldehyde 2 4-Dinitrophenylhydrazine α-Benzoin oxime Dinhenylbenzidine Benzyl 150 thiourea sım Diphenylearbazide hydrochloride Diphenylthiocarbazone *Bervllium sulphate az -Dipyridyl Bismuth nitrate Ethyl cyanoacetate n Butyl alcohol Indigo carmine 250-Butyl alcohol Iodine pentoxide Cadmium acetate Iodine trichloride Cadmium chloride 7 Iodo 8 hydroxyguinoline 5-*Cæsium chloride sulphonic acid Calcium sulphate Isatin *Cene ammonium nitrate *Lithium sulphate

1-Chloro 2.4 dinitrobenzene Chromium chloride

Cupferron

p Nitrobenzovi chloride

a-Phenanthroline

Netmn

Phosphorus pentachloride

Pyrogallol Salicylaldovir

Salicylaldoxime *Selenium

Semicarbazide hydrochloride

Silver sulphate

Sodium arsenate Sodium diethyldithiocarbamate

Sodium hydrogen tartrate Sodium pyrophosphate

*Sodium pyrophospi

*Strontium chloride

*Tellune acid *Thallium sulphate

*Thorium nitrate *Titanyl potassium oxalate

c-Tolidine

Friketohydrindene hydrate

Zinc acetate Zine powder

Only one 'AnalaR' chemical has been discontinued in the present edition. This is Ferric Chloride. Anhydrous. The difficulty of preparing a satisfactory product the unstable nature of the substance, and the very small demand for such a high quality, have contributed to this decision.

All the previously existing specifications have been critically reviewed and many have been materially revised both in the light of progress in analytical chemistry and under the guidance of our experience of users' requirements. A large number of additional tests will be found and many old tests are replaced by more modern techniques. Certain improvements of more or less general nature appear worthy of specific mention.

Specific solubility tests have been accorporated in almost every monograph. Refractive index tolerances have been included for most of the organic liquids. Following the modern trend specific gravities at 15 5715 57 have been replaced by weights per milhitite at 20. For the lower alcohols, however, the older expression has been retained because the whole system of determination and dilution in current use is based upon tables that employ at

Assays are now given for a greater number of chemicals and newer methods have been introduced wherever appropriate

The technique of electrolytic deposition has been adopted for two distinct purposes for the assay of certain metallic salts and for the removal of the principal metal from such salts to that traces of alkalis and alkaline earths may be determined by the evaporation of the resulting solution. These impurities were previously soluted by precipitating the heavier metal as the hydroxide or sulphide and there can be no doubt that a considerable proportion of the impurity was carried down by the precipitate. Wherever possible a single deposition has been made to serve both for the assay and for the test for alkalis.

In the iron salts alkalis are now determined after removal of the iron by an extraction method. Certain impurities can be determined most expediently and accurately by the use of the polarograph and no better

reason seems necessary for the untroduction of that instrument, it has, therefore, been applied to the determination of nickel in cobalt salts, of lead in copper, of copper, zine and lead in ferrous sulphate and of zine in potassium and sodium hydroxides. An extension of polarographic methods is anticipated for the future

The Karl Fischer technique for the determination of water is the first real answer to a long-standing problem of the greatest importance, and the method is now adopted in the specifications for all organic liquids amenable to this technique. The hterature relating to the determination of moisture in acctone by the Karl Fischer method is conflicting and in our own experience erratic results are obtained. The procedure has, therefore, not been applied to this substance

We have found it desirable to separate most of the phosphate and silicate tests that were previously carried out by the one reaction with the molybdate reagent. Certain ions, unavoidably present, were found to have diverse effects upon the reactions of the two impurities and the relative sensities did not always correspond with suitable limits. In some cases the silicate figure appeared only incidentally and has been omitted in the new system. On the other hand phosphate and silicate tests have been added to the specifications for the alkali carbonates and bicarbonates and the caustic alkalis.

The introduction of new methods of greater sensitivity and greater accuracy occasionally shows that the figdre previously quoted as the maximum limit of the impunity, though the most accurate in its time according to the means then available for its determination, was under-estimated Where these circumstances have been discovered it has been possible in some cases to compensate by an improvement in the quality of the chemical and thus make it possible to retain the lower figure for the limit. In other instances this has not been immediately possible and an increased figure has been guen, though it must be emphasized that the material now supplied as at least equal in punts to that issued under the older standards. This is the case with respect to the nickel content of cobalt salts. It is felt that these circumstances lend considerable support to the view, always held by the compilers of 'AnalaR' Standards, that the quantitative expression of maximum limits or of 'actual batch analyses' can be safely interprited only with reference to a specified method of testing

THE BRITISH DRUG HOUSES LTD HOPKIN AND WILLIAMS LTD

FOREWORD TO THE FIRST EDITION

By the late Professor Jocelyn F Thorpe, CBE, PhD, DSc, FRS, one time Professor of Organic Chemistry in the University of London (Imperial College)

THERE was a time, prior to 1914, when those who worked in chemical laboratories found that the only means by which they could rely on the purity and homogeneity of their reagents and research materials depended on the reputations of a few well-known firms. Even so, the consumer had in several instances to redistil or recrystallise the initial material he proposed to use before he could be certain that it possessed the necessary degree of 'purity' for his purpose. For the term 'purity' is merely relative and can never be absolute, hence the necessity for some enterion of 'purity' which will give the user the information he requires. The statement that unreliable material yields unreliable results needs no emphasis. Many research chemists have experienced the bitter disappointment caused by the discovery that the work of many months has been rendered useless by the presence of some 'alien' substance in the material used. The writer remembers that on one occasion the presence of phosphorus truchloride in a specimen of actiyl chloride obtained from a well-known continental firm led to results which took some two months of explain, and many research chemists must have had similar experiences.

There are only two ways in which the consumer can be protected against the unscripulous dealer or trader, either a specific standard must be enforced as is the case with foodstuffs, etc., or the 'purity' of the material must carry with it the guarantee of some firm or combination of firms of high standing whose reputations are bound up in the guarantee, and who are prepared to inform the consumer exactly what is meant by the word 'purity'

The former method implies the policeman, and is one which Authority and ince can apply effectively. It is, moreover, one which Authority is not likely to apply unless the well-being of the public generally is concerned. In the latter method, the need for the policeman is replaced by the reputation of the firm or firms supplying the materials, which acts as a safeguard against any lowering of the standard desired and required by the consumer. It was, therefore, under the latter method that those who controlled laboratories and research schools worked in pre war times.

Then came the war and everything was changed. It soon became apparent that the number of reagents and research chemicals actually

manufactured in this country was exceedingly meagre, and that most of them had been obtained from the continent. The continental spring having ceased to flow, the accumulated stocks in this country gradually diminished or hecame localised until a highly serious situation arose. As a temporary measure we at the Imperial College, South Kensington, founded an Exchange Bureau through which Institutions having large quantities of certain substances could barter them for others of which they might stand in urgent need. At the same time the quantity of available materials was increased by the preparation, by laboratory methods, of those substances for which there seemed to be the greatest demand. This method enabled us to tide over a difficult period, but it was obviously totally madequate to meet the requirements of the situation Fortunately British manufacturers soon began to provide the required materials in the necessary quantities and as is mentioned in more detail in the general historical introduction which follows this Foreword, the question of purity was met by the adoption of the letters 'AR' 'AR' meant Analytical Reagent', but to my mind it also meant 'All Right' As a war measure the scheme served its purpose, but, afterwards it failed because it did not fall into either of the categories mentioned above. It had neither the support of Authority nor the backing of reputation. In consequence it was made use of by all and sundry to denote materials of varying degrees of purity, and the letters AR' soon ceased to have any real significance

It is, therefore, with the greatest pleasure, as well as pleasurable anticipation, that I learn from the book of which this is the Foreword that The British Drug Houses and Hopkin & Williams have agreed to issue Laboratory Chemicals of guaranteed 'purity' bearing the registered name 'ANALAR' which will serie as a guarantee based on the great reputation enoved by these well known firms

The book deals with some 200 substances, and in each case the physical and chemical properties are given in order that the degree of 'punty' attained may be indicated In itself, apart from this, the books is a valuable record of the chief properties of the substances with which it deals. It is understood that further compounds will be added as circumstances require

All users will wish the compilers every success in their new enterprise

JOCELYN THORPE

PREFACE TO THE FIRST EDITION

THE first handbook describing definite tests and standards of purity for chemical reagents would appear to have been *Die Prifining der chemichen Reagentien auf Reinheit* by C Krauch, published in Germany in 1888. The publication of this volume was later taken over by the firm of E Merck, the latest edition of whose work was issued in 1931. An English translation of Krauch's book was made by J A Williamson (then chef chemist to Baird & Tatlock [London] Ltd.) and L W Dupre in 1922, but the manufacture of reagents conforming to these specifications of purity remained in German hands

In 1914, the supply of German laboratory chemicals being cut off, are joint committee appointed by the Institute of Chemistry and the Society of Public Analysis drew up specifications of purity, to which they applied the letters 'A R' signifying 'Analystical Reagent', a designation which has since become well known throughout the British Empire by all users of pure chemicals for scientific purposes The number of specifications originally issued by the joint committee in 1915, was 88

There was, however, already available in this country a book of speciations entitled Analytical Reagents Standards and Tests, compiled by Edmund White and published in 1911 by Hopkin & Williams Ltd., who had been for many years manufacturing and marketing chemical complying with these tests. This book contained monographs relating to 137 substances. It was reprinted in 1916, a second edition was published in 1925, and a third edition in 1921.

The war time need for British laboratory chemicals (including analytical reagents) was met by the strenuous efforts of the two Brins most directly concerned Hopkin & Williams Lid continued to manufacture both to their own and to the 'AR' specifications, while The British Drug Houses Lid opened up a special department for the manufacture of laboratory chemicals As a result an adequate supply of these chemicals was soon ensured to workers in this country

In 1925 the B D H approached the two official bodies responsible for the 'AR' specifications with the suggestion that the specifications should be revised and extended, but their reply was that their action had been a war emergency measure and that they did not wish to take any further part in this work. The B D H then proposed that they should themselves carry out the work, and this they did with the consent and approval of the Institute of Chemistry and the Society of Public Analysis This resulted in the publication, in January 1926, of The B D.H Book of A B Standards containing 158 specifications with a prefatory note which had been submitted to and approved by the Councils of the two bodies mentioned Meanwhile Hopkin & Williams Ltd had in 1925 issued a revised edition of their book containing 144 specifications

Subsequently the specifications of both firms have been further revised and extended in the light of increased experience and greater knowledge, while the standard of purity has been considerably raised. Thus, in 1931, Hopkin & Williams published the third edition of their book containing 178 monographs, prepared and issued in collaboration with Batic & Tatlock (London) Ltd, who had been themselves producing analytical reagents for some ten years. In 1932 the BD IP published the second edition of their book, which contained, in addition to revised monographs for the 158 chemicals in the first edition, new monographs for 50 other substances, making a total of 268

The specifications published by the two firms, although on similar lines, were not identical and this occasionally led to misunderstanding on the part of users of laboratory chemicals. Of much greater moment, bowever, was the increasing evidence that the letters. A R 'were being brought into disrepute by the action of some firms in (a) applying them indiscriminately to substances in respect of which no specification existed, and (b) issuing chemicals labelled 'A R 'which did not conform to the published specifications. Professional chemists, Universities, public bodies and in fact all critical users of laboratory chemicals, left that designation 'A R 'was losing the value which at one time made the term synonymous with purity and reliability, so that in merely specifying 'A R' they could no longer rely upon getting material of the requisite degree of purity

Accordingly it seemed desirable that the BDH and Hopkin & Williams should undertake the unification of their respective series of specifications, so that a definite standard of purity should be available in this country. This project has been carried out during the past year by co-operation between the chemists of the two firms, in the course of which there has been conducted an extensive investigation into the technique of detecting minimal quantities of impurities. The outcome of this collaboration is the publication of the present book, the two firms being the joint owners of the copyright therein. The work contains 220 specifications, and is published under the title

'AnalaR' Standards for Laboratory Chemicals

This book provides chemists with a revised and up to date series of specifications for laboratory chemicals which are sold by, and carry the

guarantee of, both firms under the trade mark 'AnalaR'. In the preparation of the specifications full advantage has been taken of recent advances in analytical practice, and many new and delicate tests have been devised. Some of the former 'AR' specifications have been made more stringent, others have been more accurately defined

The word 'AnalaR' was chosen as a new designation to replace the letters 'A R', which, for the reasons already indicated, it was considered desirable to discontinue 'AnalaR' is a registered trade mark and is the joint property of the two firms. Users of 'AnalaR' chemicals can feel satisfaction and reassurance in the knowledge that the standards of purity are definite and precise, and that all chemicals issued under this designation are guaranteed by the two firms to conform to those standards

THE BRITISH DRUG HOUSES LTD HOPKIN & WILLIAMS LTD

September 1934

EXPLANATORY NOTES

Conditions of Testing

The routine examination of reagent chemicals over many years has demonstrated the necessity for standardising the conditions under which limit tests for impurities are earned out. It has been recognised that tests which give satisfactory results in one laboratory may fail in another laboratory owing to slight differences in technique. In order to avoid such differences, particular stitention has been paid to the wording of the tests so that only one interpretation can be placed on them.

The details of the tests which have been worked out for the detection of minute traces of certain impurities are described with particular care to that consistent results may be obtained by analysts working independently in different laboratories. The tests do not provide against all possible impurities but do allow for all those that have been found significant in analytical Dractice.

Types of Tests Employed

Wherever possible, methods have been used for determining the actual amount of impurity present, but in testing chemicals for extremely minute amounts of impurities, it is frequently impossible to specify the amount present as a definite quantitative figure. There is a limiting testiativity to all tests, and where no reaction for an impurity is obtained, it cannot be stated with certainty that the particular impurity is absent. The limiting values of such tests have been studied and where no reaction is observed, the amount of impurity present is recorded as heing less that the minimum amount which under the conditions of the test gives the faintest possible reaction.

The tests for impurities fall into two groups -

- Tests in which the method is sufficiently sensitive to afford a true measure of the quantity of impurity present at, or even below, the limit allowed
- (2) Tests in which the amount of impurity sought is close to the detectable threshold limit imposed by the sensitivity of the best available method

In the first group are tests, such as the Gutzeit determination of minute quantities of arsenic in which it is easily possible to obtain quantitative results by matching the result of the experiment with suitable standards. For reasons given elsewhere in these notes however, the

individual monographs refer only to standards which represent the desired limits

The second group embraces tests, typified by the sulphate and chloride tests, which do not lend themselves to quantitative expression, and in these tests the smallest quantities that can be detected under the conditions prescribed have, in most cases, been adopted as the maximum limits of these impurities. In this connection, it is of extreme importance that the conditions of the test be adhered to, as, in many cases, slight variations in technique may make considerable differences in the amount of impurity which can be detected

Maximum Limits of Impurities

A statement of the maximim limits of impurities will be found in each monograph. The figures that are given are intended to represent the amount of impurity that the test will detect. It must be understood, however, that many tests that depend upon the comparison of opalescences, turbidities and colours are subject to certain errors due to the disturbing effect of the other substances in the solution. For this and similar reasons the figures quoted cannot always be regarded as exact and are subject to revision as the technique for the estimation of very small amounts of impurities becomes more developed. Consequently it must be stated that the standards to which the chemical conforms are those of the actual tests, and the "maximum limits of impurities" are a rational numerical interpretation of those tests. This, of course, does not imply that the amounts stated are necessarily present in products conforming to the test, but the figures represent the maximum permissible limits. The amounts of impurities precent in "AnalaR" chemicals are usually considerably less than the maximum permissible limits, but this additional refinement is not regarded as being of much practical interest to the user

The compilers will at all times be grateful for any information from investigators who have specialised knowledge

Reagent Solutions

The strengths of the reagent solutions employed in the tests are given in the Appendix. As far as possible these are described in terms of normality or as molar solutions, this makes for convenience and simplicity. The dilute acuds and dilute alkalis are all approximately SN, which is a convenient strength for general use, these are always referred to in the test as 'dilute acetic acid', etc. When the word 'dilute' is omitted, it is intended that the concentrated acid should be used.

Time

Where no length of time is stated, a period of 5 minutes should be allowed before observing the result of a test

Solubility Tests

In a few cases quantitative limits have been laid down for the amount of insoluble matter. In general, it is required that the substance shall give a 'clear solution' when a specified quantity is dissolved in a specified volume of solvent. This is to be interpreted as signifying a reasonably clear solution as observed in the ordinary manner without the aid of special instruments. No solid chemical substance prepared commercially dissolves in a solvent to yield a solution in which particles of dust cannot be detected, if sufficiently refined methods of observation be employed Usually, the proportion of insoluble matter is so small that a quantitative determination by filtering off and weething is unite unnecessary.

Tests for Chlorides

The minimum opalescence which it is possible to perceive depends to a large extent on the quality of the light under which the observation is conducted. In many tests the expression no opalescence will be found, this is intended to mean an opalescence less than that produced by the following procedure —

To 50 ml of water add 0 1 ml of standard chloride solution (1 ml = 0 mg Cl) r ml of dilute natrie acid and 1 ml of silver natrate solution, mix and observe after 5 manutes

Tests for Residue

Where large quantities of reagents are used in carrying out a test it may be necessary to apply a correction for the amount of impurity in the reagents. This applies particularly to the tests for alkalis and other metals where the metallic radical of the sale is removed by precipitation and the residue obtained on evaporation of the filtrate is ignated and weighed. In some cases it has been found that the residue from the regents exceeds that from the substance under examination. Further, it must be remembered that a filter paper may contribute to a filtrate soluble matter weighing one milligram or an even larger amount. In order to obviate maccuraces due to such causes it is essential that certain determinations should be accompanied by blank experiments carried out on the reagents used so that the necessary corrections can be made.

Volumetric Standards

Many substances have been proposed for the purpose of standardising volumetric solutions. As the result of long experience in the laboratories of the joint compilers, it is recommended that the following substances only should be used as primary standards in work of high accuracy.

Potassium dichromate Potassium hydrogen phthalate Potassium iodate Sodium carbonate (anhydrous) Sodium chloride Sodium oxalate

These are anhydrous salts and they may be dried by heat without change of composition

The chemicals mentioned below are often used for standardising purposes, but they should be looked upon as being secondary standards. Several contain water of crystallisation and consequently are liable to gain or lose moisture in accordance with the humidity of the atmospher and the care with which they are stored. Such salts cannot be dired immediately before use and consequently must be stored in well closed containers.

Antimony potassium tritrate Arsenious oxide Benzoic acid Ferrous ammonium sulphate Guanidne carbonate Hydrazine sulphate Oxalic acid Potassium hydrogen tartrate Silver nitrate Sodium borate

Chemicals for Buffer Solutions

The following chemicals, specifications for which are included in this book, are suitable for preparing buffer solutions for use in the determination of hydrogen ion concentration

Acette acid
Aminoacette acid
Boric acid
Cutric acid
Potassium chloride
Potassium dihydrogen phosphate
Potassium hydrogen phthalate
Potassium tetrovalate
Sodium chloride
Sodium chloride
Sodium chloride
Sodium chloride

Atomic Weights

International Atomic Weights, 1947, have been used in calculating the molecular weights factors, etc. A table is given on page 297

Temperatures are stated in Centigrade degrees and all tests are conducted at room temperature (15° to 25°) unless otherwise stated

Determinations of Weight per ml and Specific Gravity determinations are based on weighings in air

Bolling Range Tests are carried out in the apparatus and by the method of the British Standard Specification No. 658—1946

Melting Points are determined on the freshly dred material which, contained in a suitable tube, is introduced into the heated bath liquid when the latter reaches a temperature approximately 10° below the anticipated melting point. The liquid is heated so as to produce a temperature rise of approximately 2° per minute.

Freezing Points are determined by the method described in the Report of the Essential Oil Sub Committee to the Standing Committee on Uniformity of Analytical Methods, Analysis, 54, 335 (1929)

It has not been considered possible to acknowledge the many sources of the tests described, distributed as they are through many securitie publications. All have been the subject of extended experiment in the BDH and H & W Analytical Laboratories. Many of the tests are original and others have been modified to suit the particular requirements of the chemical for which they are used.

THE BRITISH DRUG HOUSES LTD HOPKIN & WILLIAMS LTD

'ANALAR' STANDARDS FOR LABORATORY CHEMICALS

ANATAR ACETIC ACID

(Glacial)

CH, COOH = 60 os

Maximum Limits of Impurities

Non-volatile Matter	0 001	per cent
Chloride (Cl)	0 0002	per cent
Sulphate (SO ₄)	0 0004	per cent
Heavy Metals (Pb)	0 0002	per cent
Iron (Fe)		per cent
Bromine absorbed (Br)	o 006	per cent
Oxygen absorbed from Dichromate (O)	0 003	per cent
Arsenic (As ₂ O ₂)	0 0001	per cent
(1	part per	million)

- t Description -A clear colourless liquid with a characteristic odour
- 2 Solubility.-Miscible in all proportions with water, and with alcohol, forming clear colourless solutions
 - 3 Freezing Point -Not below 15 50
- 4 Non-volatile Matter .- Evaporate 50 ml to dryness on a waterbath Not more than 0 5 mg of residue should be left
- 5 Chloride -Dilute 5 ml with 45 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 6 Sulphate —To 50 ml add 02 ml of N/t Na₂CO₃ and evaporate to dryness on a water bath dissolve the residue in 10 ml of water and I ml of N/I HCl, filter if necessary, and add I ml of barium chloride solution. Any turbidity produced should not be greater than the 'standard turbidity' defined in appendix 2
- 7 Heavy Metals and Iron -- Dilute 10 ml with 30 ml of water and add 15 ml of strong ammonia solution, cool and pass hydrogen sulplude through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2

ACETIC ACID (Glacial)-continued

- 8 Bromine Absorption -Introduce 20 ml into a 50 ml graduated stoppered flask, add 25 ml of water and 5 ml of an approximately deci normal solution of broining in glacial acetic acid. Shake and adjust with water to exactly so ml Papette off ammediately 10 ml of this, add 20 ml of water and 5 ml of potassium iodide solution and titrate the liberated iodine with N/50 Na₂S₂O, using starch as indicator. Keep the remainder in a dark place at 20° for I hour and then titrate a second to ml in the same manner The difference between the two titrations should not exceed o 15 ml
- o Oxygen Absorption -Mix to ml with 1 ml of N/10 K.Cr.O. and to ml of sulphuric acid, cool and allow to stand for to minutes. dilute with 50 ml of water, again cool, add 1 ml of potassium iodide solution and titrate the liberated jodine with N/10 Na-S.O. Not less than o 6 ml of N/ro Na₂S₂O₂ should be required
- 10 Arsenic Dilute 10 ml with 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a o or mg standard stain
- 11 Assay -Dilute 2 to 3 g with 50 ml of water and titrate with N/1 NaOH using phenolphthalein as indicator

1 ml N/r NaOH = 0 o6005 g CH, COOH

Not less than oo s per cept should be indicated

ANALAR ACETIC ANHYDRIDE

 $(CH_3 CO)_t O = 102 09$

Maximum Limits of Impurities

Non-volatile Matter g 0025 per cent Chloride (Cl) g oor per cent g ooz per pent Sulphate (SO₄) Heavy Metals (Pb) e coz per cent Iron (Fe) o oos per cent Phosphorus Compounds (P) o poos per cent Organic Impurities passes test

- 1 Description -A clear colourless liquid with a pungent odour
- 2 Solubility.—Slowly soluble in water with formation of acetic acid Readily soluble in alcohol and in ether 2 Weight per ml at 20° .- 1 075 to 1 085 g

- 4. Non-volatile Matter,—Evaporate 20 ml to dryness on a sand-bath Not more than 0 5 mg of residue should be left
- 5 Chloride.—Dissolve ro ml in 40 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 6 Sulphate —Dissolve 5 ml in 50 ml of water, add 1 ml of barium chords solution and allow to stand for 18 hours No turbidity or precipitate should be produced
- 7 Heavy Metals and Iron.—Dissolve 1 ml in 40 ml of water, add 10 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Phosphorus Compounds—Boil 5 ml with 10 ml of water and 5 ml of nutre acid, to the hot solution add 10 ml of ammonium nitro-molybdate solution and maintain at about 40° for 2 hours No yellow precipitate should be produced
- g Organic Impurities.—(a) Dissolve 2 ml in 20 ml of water and add 38 ml of N/r NaOH The solution should have no foreign odour
- (b) Boil gently 20 ml with 5 ml of glycerol under a reflux condenser for x hour, evaporate off the excess of anhydride, cool, mix with 20 ml of dulute nitric acid and 30 ml of water and allow to stand for 30 minutes A clear solution free from flocculent matter should be obtained
- 10 Assay.—Dissolve 2 g in 50 ml of N/1 NaOH, allow to stand for 1 hour and titrate with N/1 HCl using phenolphthalein as indicator

$\frac{\text{ml of N/r NaOH used}}{\text{weight of anhydride}} = a$

Dissolve a further 2 g in 20 ml of dry benzene, cool in 1ce, and add a cold solution of 10 ml of dry andine in 20 ml of dry benzene Allow to stand for 1 hour, add 50 ml of N/1 NaOH, shake vigorously and titrate with N/1 HCl using phenolphthalem as indicator

 $\frac{\text{ml of N/s NaOH used}}{\text{weight of anhydride}} = b$

then to 2 (a - b) = per cent of (CH₂ CO)₂O

Not less than 95 per cent should be indicated

ANALAR ACETONE

(CH₂),CO = 58 o8

Maximum Limits of Impurities

Activity 0 1 ml N/r per cent
Alkalinty 0 1 ml N/r per cent
Non volatile Matter 0 1 ml N/r per cent
Oxygen absorbed (0) 0 0025 per cent
Oxygen absorbed (0) 0 0005 per cent
Vater 1 0 per cent

- Description —A clear colourless liquid with a characteristic odour
 Solubility —Miscible in all proportions with water forming clear colourless adutions
- 3 Activity—Dilute so ml with so ml of carbon dioxide free water, add o s ml of phenolphthalein solution and stirate with N/so NaOH Not more than o s ml of N/so NaOH should be required to produce a pink tint.
- 4 Alkalınıty Dilute 10 ml with 10 ml of water, add 02 ml of methyl red solution and titrate with N/10 HCl Not more than 01 ml of N/10 HCl should be required to produce a red tint
 - 5 Weight per ml at 20° -0 790 to 0 792 g
 - 6 Refractive Index -nte 1 3580 to 1 3600
- 7 Boiling Range -Not less than 95 per cent should distil between 56 0° and 56 5°
- 8 Non-volatile Matter—Evaporate 50 ml to dryness on a water bath Not more than 1 mg of residue should be left
- 9 Oxygen Absorption —To 20 ml add 0 1 ml of N/10 KMnO₄ and allow to stand for 15 minutes The pink colour should not entirely disappear
- 10 Water —To 2 ml add 10 ml of curbon disulphide A clear solution should be produced

ANALAR

ACETYL BROMIDE

CH, COBr = 122 96

Maximum Limits of Impurities

Non volatile Matter oot per cent Sulphate (SO₄) c co2 per cent Phosphorus Compounds (P) o co25 per cent

The

1 Description -A clear colourless or slightly yellow liquid

product as issued contains small amounts of acetic and hydrobromic acids

- 2 Solubility Decomposed by water with formation of acetic and
- 3 Non volatile Matter Evaporate 10 ml to dryness on a water bath Not more than 1 mg of residue should be left
- 4 Sulphate —Dissolve 5 ml m 50 ml of water add 1 ml of barnum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 5 Phosphorus Compounds—Treat 1 ml cautiously with 1 ml of water add 1 ml of nitre acid boil cool add 20 ml of water and 10 ml of ammonium nitro molybdate solution and maintain at about 40° for 2 hours. No yellow precipitate should be produced.
- 6 Assay Dissolve r g in 50 ml of N/1 NaOH and titrate with N/1 H₂SO₄ using phenolphthalem as indicator
 - 1 ml N/1 NaOH 0 06148 g CH, COBr

Not less than 97 5 per cent should be indicated

hydrobromic acids

Dilute the neutralised liquid with water to produce 250 ml and titrate 50 ml of this with N/10 AgNO₃ using potassium chromate as indicator

ı ml N/10 AgNO3 - 0 0123 g CH2 COBr

Not less than 97 5 per cent should be indicated

Non volatile Matter

ANALAR ACETYL CHLORIDE

CH, COCI = 28 50

Max mum Limits of Impurities

1	Description -A clear liquid	colourless or not more than very
	Iron (Fe)	o coos per cent
	Heavy Metals (Pb)	o cor per cent
	Phosphorus Compounds (P)	o oozs per cent
	Sulphate (SO ₄)	0 002 per cent

- slightly yellow The product as issued contains small amounts of acetic and hydrochloric acids

 2 Solubility —Decomposed by water with formation of acetic and
- hydrochlone acids and forming a clear colourless solution
 3 Bolling Range —Not less than 95 per cent should distil between
 50 and 52°
- 4 Non volatile Matter—Evaporate 10 ml to dryness on a water bath. Not more than 1 mg of residue abould be left

o or per cent

ACETYL CHLORIDE-continued

- 5 Sulphate.—Dissolve 5 ml in 50 ml of water, add 1 ml of barum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Phosphorus Compounds—Treat 1 ml cautiously with 1 ml of water, add 1 ml of nitric acid, boil, cool add 20 ml of water and 10 ml of ammonium nitro mollybdate solution and maintain at about 40° for 2 hours No vellow precipitate should be produced.
- 7 Heavy Metals and Iron—Dissolve 2 ml in 35 ml of water, add 15 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Assay Dissolve 1 g in 50 ml of N/1 NaOH and titrate with N/1 H₂SO₄ using phenolphthalein as indicator
 - 1 ml N/1 N2OH = 0 03925 g CH₃ COC

Not less than 98 per cent should be indicated

Dilute the neutralised liquid with water to produce 250 ml and titrate so ml of this with N/to AgNO, using potassium chromate as indicator

Not less than 98 per cent should be indicated

ANALAR

ALUMINIUM AMMONIUM SULPHATE (Ammonium Alum)

(Anniomant Alam)

$AINH_4(SO_4)_3 12H_4O = 453 33$

Maximum Limits of Impurities

Chloride (Cl) 0 004 per cent
Heavy Metals (Pb) 0 004 per cent
Iron (Fe) 0 001 per cent

Alkalis and Alkalise Earths (Na) 003 per cent

- Description Colourless crystals or a crystalline powder
 Solubility Dissolve 5 g in 50 ml of water A clear colourless
- 2 Solution Should be produced
 3 Chloride —Dissolve 25 g in 50 ml of water and add 1 ml of
- 3 Chloride Dissolve 25 g in 50 ml of water and such in the dilute nitre and and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 4 Heavy Metals —Dissolve o 5 g in 50 ml of water, add 2 ml of sodium hydroxide solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2

- 5 Iron.—Dissolve I g in 10 ml of water and I ml of dilute hydrochloric acid and add I dop of NJto KMnO4, mix add 5 ml of ammonium thiotyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating I ml of standard iron solution (I ml = 0 oI mg Fe) in the same manner
- 6 Alkalis and Alkaline Earths —Dissolve 5 g in 100 ml of hot water, add 10 ml of dilute ammonia solution boil gently for 2 minutes and filter. Evaporate 55 ml of the filtrate to dryness and ignite the residue gently. Not more than 25 mg should be obtained
- 7 Assay.—Dissolve 2 5 g in 250 ml of water, add 2 g of ammonium chloride and heat to holling Add a slight excess of dilute ammonia solution, hoil gently for 3 minutes, allow to stand for 10 minutes, filter, wash with water, ignite at 1100° and weigh

Weight of Al₂O₃ × 8 894 = weight of AlNH₄(SO₄)₂ 12H₂O Not less than 99 5 per cent should be indicated

ANALAR

ALUMINIUM OXIDE

(Calcined)

 $Ai_{2}O_{5} = 10194$

Maximum Limits of Impurities

 Chloride (Cl)
 0 005 per cent

 Sulphate (SO₄)
 0 01 per cent

 Iron (Fe)
 0 01 per cent

 Loss on Ignition
 1 0 per cent

- 1. Description.—A dull white powder
- 2 Solubility.—Insoluble in water and in dilute acids. Partially soluble in sodium hydroxide solution
- 3 Chloride.—Boil z g with 50 ml. of water and 1 ml of dilute nitric acid, cool and filter and to the filtrate add 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 4 Sulphate —Boil 1 g with 50 ml of water and 1 ml of dilute hydrochloric acid, cool and filter and to the filtrate add 1 ml of banum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- should be produced

 5 Iron.—Boil or g with 10 ml of water and 1 ml of dilute hydrochloric acid, cool and filter, to the filtrate add 1 drop of N/10 KMnO4, mix, add 5 ml of ammonium theocyanate solution and 10 ml of a mixture

ALUMINIUM SULPHATE-continued

red as indicator. Not less than 9.4 ml of N/10 NaOH should be required

8 Assay —Dissolve 15 g in 250 ml of water, add 2 g of ammonium chloride and heat to boiling Add a slight excess of dilute ammonia solution, boil gently for 3 minutes, allow to stand for 10 minutes, filter, wash with water, ignite at 1100° and weigh

Weight of Al₂O₃ × 3 358 = weight of Al₂(SO₄)₃

Not less than 51 o per cent and not more than 54 5 per cent should be indicated

ANALAR AMINOACETIC ACID

NH, CH, COOH = 75 07

Maximum Limits of Impurities

Sulphated Ash	005 per cent
Chloride (CI)	o oor per cent
Sulphate (504)	0 005 per cent
Heavy Metals (Pb)	0 002 per cent
Iron (Fe)	o oor per cent
Ammonia (NH ₄)	O OOF per cent

- I Description -A white crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—Dissolve r g in too ml of carbon doxide free water To 50 ml of the solution add or 1 ml of N/10 NAOH, the PH of the solution should not be less than 65. To the other 50 ml of the solution add or ml of N/10 HCl. the pH of the resulting solution should not be greater than 55. Use bromocresol purple as indicator in both tests.
- 4 Sulphated Ash.—Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Chloride—Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 6 Sulphate.—Dissolve z g in 50 ml of water, add i ml of dilute bydrochloric acid and i ml of banum chloride solution and allow to stand for i hour. No turbidity or precipitate should be produced.
- 7 Heavy Metals and Iron—Dissolve r g in 45 ml of water, add 5 ml of dilute ammonra solution and pass bydrogen sulphide through

the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2

- 8 Ammonia Dissolve 1 g m 45 ml of water, add 5 ml of sodium hydroxide solution and distil 15 ml. To the distillate add 35 ml of water and 2 ml of Nessler's reagent Any colour produced should not exceed that given by the addition of 2 ml of Nessler's reagent to 50 ml of water containing 5 ml of standard ammonia solution (1 ml == 0 or mg NH₄)
- 9 Assay —Digest o 3 g with 10 ml of sulphune acid in a Kjeldahl flask until colourless, cool, add 150 ml of water and 100 ml of sodum hydroxide solution, distil the liberated ammonia and collect it in 50 ml of N/10 HCl. Titrate the excess of acid with N/10 NaOH using methyl red as indicator.
 - 1 ml N/10 HCl = 0 007507 g NH2 CH2 COOH
- * Not less than 99 per cent should be indicated

ANALAR AMMONIA SOLUTION

(about 35 per cent NH2)

NH2 = 17 03

Maximum Limits of Impurities

Non-volatile Matter	0 002	per cent
Chloride (Cl)	10001	per cent
Sulphate (SO ₄)	0 0005	per cent
Sulphide	passes test	
Phosphate (PO ₄)	0 0002	per cent
Silicate (SiO ₂)	0 001	per cent
Carbonate (CO ₃)	0 003	per cent
Heavy Metals (Pb)	0 00002	per cent
Iron (Fe)	0 00001	per cent
Tarry Matter	passes test	
Oxygen absorbed (O)	0 0008	per cent
Arsenic (As ₂ O ₃)	0 000000	per cent
	(o o5 part pe	r million)

- 1 Description —A clear colourless liquid with a strong pungent odour
- 2 Specific Gravity.—About o 880
- 3 Non-volatile Matter Evaporate 100 ml to dryness on a water bath Not more than 2 mg of residue should be left
- 4 Chloride—Evaporate 10 ml on a water bath until reduced to 1 ml, dilute with 50 ml of water and add 1 ml of dilute mitric acid and 1 ml of silver nutrate solution No opalescence should be produced

ANALAR AMMONIUM BICARBONATE

$NH_1HCO_s = 79.06$

Maximum Limits of Impurities

Non volatile Matter	o or per cent
Chloride (CI)	o oooz per cent
Sulphate (SO ₄)	D DO2 per cent
Heavy Victals (Pb)	o oooz per cent
Iran (Fe)	a coar per cent
Tarry Matter	no react on
Arsenic (As ₂ O ₃)	0 00002 per cent
	(o 2 part per million)

- r Description -- Colouriess crystals or a white powder with a slight ammoniacal odour
- z Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Non volatile Matter Heat 10 g gently until the greater part is volatilised add 2 drops of sulphuric acid and ignite gently. Not more than 1 mg of residue should be left.
- 4 Chloride—Boil 5 g with 50 ml of water until the volume is reduced to 5 ml add 45 ml of water 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 5 Sulphate—Boil 5 g with 50 ml of writer until the volume is reduced to 5 ml add 45 ml of water 1 ml of ddute hydrochloric and a ml of barium chloride solution and allow to stand for 1 hour. No turbid ty or precipitate should be produced.
- 6 Heavy Metals and Iron.—Bod to g with 50 ml of water until the volume is reduced to 5 ml add 5 ml of dilute hydrochlore and 30 ml of water and 10 ml of dilute armonius solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 7 Tarry Matter —Treat 5 g with 15 ml of water and 5 g of citric acid and stir until dissolved No tarry odour should be perceptible
- 8 Arsenic—Boil 10 g with 50 ml of water until the volume is reduced to 5 ml add 45 ml of water and 10 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than 2 0 002 mg standard stain.
- 9 Assay Dissolve 3 g in 50 ml of N/t HCl and 50 ml of water and titrate the excess of acid with N/t NaOII using methyl red as indicator

1 ml N/1 HCl - o-o-906 g NH4HCO3

Not less than 99 per cent and not more th.n 101 per cent should be indicated

ANALAR AMMONIUM BROMIDE

 $NH_{a}Br = 97.96$

Maximum Limits of Impurities

Reaction	pH not less than 4.5
Non volatile Matter	oor per cent
Chloride (Cl)	0 25 per cent
Bromate (BrO ₂)	o cor per cent
lodide (I)	o os per cent
Sulphate (SO ₄)	o or per cent
Heavy Metals (Ph)	o ooos per cent
Iron (Fe)	o occ25 per cent
Moisture	os per cent

1 Description -A white crystalline powder

2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced

3 Reaction—The reaction of a solution of 1 g in 10 ml of carbon dioxide free water should not be less than pH 45 using bromocresol green as indicator

4 Non-volatile Matter —Heat to g very gently until the greater part has volatilised add a few drops of sulphunc and and ignite gently Not more than i mg of residue should be left.

5 Chloride—Dissolve 4 g in 75 ml of water and 25 ml of intro and boil gently and pass a current of halogen free air through the liquid until all the liberated bromners removed Cool add to ml of N/10 AgNO₂ filter wash with water and utrate the filtrate and washings with N/10 NH₂SCN using ferric ammonium subplate as indicator Not less than 7.2 ml of N/10 NH₂SCN should be required

6 Bromate -Dissolve 1 g in 10 ml of water and add 1 ml of dilute

sulphuric acid No yellow colour should be produced

7 lodude—Dissolve 1 g in 10 ml of water add 0 05 ml of ferric chloride solution and 1 ml of starch solution and allow to stand for 10 minutes No blue colour should be produced.

8 Sulphate — Dissolve 1 g in 30 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barnum chloride solution and allow to stand for 6 hours No turbidity or precipitate should be produced

o Heavy Metals and Iron—Dissolve 4 g in 45 ml of water add 5 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not he deeper than the standard colours defined in appendix 2

10 Moisture -Dry 5 g at 100° for one hour The loss in weight should not exceed 25 mg

(Cont nued overleaf)

4 WMONIUM BROMIDE-continued

1 ml of N/10 AgNO2 = 0 co9796 g NH2Br

Not less than 99 a per cent should be indicated

ANALAR

AMMONIUM CARBONATE

Maximum Limits of Impurities

Non volatile Matter	oor percent
Chloride (Cl)	o coo2 per cent
Sulphate (SO ₄)	0 002 per cent
Phosphate (PO ₄)	o oor per cent
Silicate (SiO.)	o coos per cent
Thiogyanate (SCN)	o cor per cent
Heavy Metals (Pb)	o oooa per cent
Iron (Fe)	o coor per cent
Tarry Matter	no reaction
Arsenie (As ₂ O ₃)	o cocoa per cent
	(0 2 part per million)

- Description White powder or translucent crystalline masses with a strong ammoniacial odour. Cons six of an approximately equimolecular mixture of ammonium becarbonate. NH₄HCO₂ – 7906 and ammonium carbamate. NH₄COONH₄ – 78 07
- 2 Solubility —Partially soluble in alcohol Dissolve 5 g in 50 ml of water a clear colourless solution should be produced
- 3 Non volatile Matter—Heat to g gently until the greater part is volatilised add 2 drops of sulphuric acid and ignite gently. Not more than 1 mg of residue should be left.
- 4 Chloride—Boil 5 g with 50 ml of water until the volume is reduced to 5 ml, add 45 ml of water 1 ml of dilute nitric and and 1 ml of silver nitriae solution No opalescence should be produced.
- 5 Sulphate—Boil 5 g with 50 ml of water until the volume is reduced to 5 ml add 45 ml of water 1 ml of thinte hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 6 hours No turbidity or precipitate should be produced
- 6 Phosphate and Sillcate—Dissolve 1 g in 10 ml of water and evaporate in a platinum dish until reduced to 1 ml dilute with 20 ml

of water, add I ml of dilute sulphuric acid, I ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes Any blue colour produced should not be deeper than the "standard colour" for silicate defined in appendix 2

- 7 Thiocyanate.—Dissolve 5 g m 50 ml of water and boil until the volume is reduced to 10 ml, cool, add 10 ml of dilute nitric acid, 30 ml of water and 1 drop of ferric chloride solution. No red or yellowish brown colour should be produced
- 8 Heavy Metals and Iron—Boil 10 g with 50 ml of water until the volume is reduced to 5 ml add 5 ml of dilute hydrochloric acid, 30 ml of water and 10 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 9 Tarry Matter -Treat 5 g with 15 ml of water and 7 g of citric acid and stir until dissolved. No tarry odour should be perceptible
- to Arsenic.-Boil to g with 50 ml of water until the volume is reduced to 5 ml, add 45 ml of water, 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a o ooz mg standard stain
- II Assay.-Dissolve 2 g in 50 ml of N/1 HCl and 50 ml of water and titrate the excess of acid with N/1 NaOH using methyl red as indicator

1 ml N/1 HCl = 0 01703 g NH.

Not less than 31 per cent of NH2 should be indicated, equivalent to 95 3 per cent of NH, HCO, NH, COONH,

ANALAR AMMONIUM CHLORIDE

NH,Cl = 53 50

Maximum Limits of Impurities

Reaction	pH not less than 4 5		
Non volatile Matter		0.01	per cent
Sulphate (SO ₄)		100	per cent
Nitrate (NO ₄)		0 00005	per cent
Phosphate (PO4)		100 0	per cent
Thiocyanate (SCN)		100 0	per cent
Heavy Metals (Pb)		0 0004	per cent
Iron (Fe)		0 0002	per cent
Tarry Matter		no reac	tion
Arsenic (As ₂ O ₃)		0 0001	per cent
		(r part pe	r million)

(Continued overleaf)

AMMONIUM CHLORIDE—continued

- 1 Description.-A white crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction.—The reaction of a solution of 1 g in 10 ml of carbon doxed free water should not be less than pH 4.5, using bromocresol green as indicator
- 4 Non-volatile Matter —Heat 10 g gently until the greater part is volatilised, add 2 drops of sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Sulphate.—Dissolve 5 g in 50 ml of water add i ml of dilute hydrochloric acid and i ml of barium chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced
- 6 Nitrate—Dissolve o 1 g in 1 ml of N/10 HCl and add 4 ml of diphenylbenzidne reagent. Any blue colour produced should not be greater than that produced by adding 4 ml of the reagent to 1 ml of N/10 HCl.
- 7 Phosphate.—Dissolve 1 g in 20 ml of water add 3 ml of dilute sulphune acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour. defined in appendix 2
- 8 Thiocyanate Dissolve 5 g in 40 ml of water and mix with 05 ml of cupric sulphate solution and 01 ml of pyridine then add 5 ml of chloroform shake vigorously in a separating funnel and allow to separate Draw off the lower layer shake it with 2 ml of water and again allow to separate The chloroformic layer should not be coloured yellow or green
- 9 Heavy Metals and Iron —Dissolve 5 g in 45 ml of water add 5 ml of dilute ammonia soliuson and pass bydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 10 Tarry Matter -- Moisten 2 g with 1 ml. of nitric seid and dry in 2 porcelain dish on 2 water bath. The residue should be perfectly white
- 11 Arsenic —Dissolve 5 g m 50 ml of water add 10 ml of stamated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0.00 g mg standard stain
- 12 Assay, Dasolve 0.2 g in 50 ml of water and titrate with N/10 AgNO₃ using potassium chromate as indicator

1 ml N/10 AgNO3 = 0 00535 g NH4Cl

Not less than 99 per cent should be indicated.

ANALAR

AMMONIUM DICHROMATE

 $(NH_4)_2Cr_1O_7 = 252 t0$

Maximum Limits of Impurities

Chloride (CI)	o oot per cent
Sulphate (SO ₄)	o or per cent
Aluminium (Al)	o oo3 per cent
Calcium (Ca)	o oos per cent
Alkalıs (Na)	o r per cent

- 1 Description.—Orange red crystals or a crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear orange-red solution should be produced
- 3 Chloride,—Dissolve 1 g in 45 ml of water and add 5 ml of dilute nutric acid and 0 5 ml of silver nitrate solution. No opalescence should be produced
- 4 Sulphate Dissolve 2 g in 45 ml of water, add 7 ml of dilute hydrochloric acid and 1 ml of battum chloride solution and allow to stand for 6 hours. No turbuidty or precipitate should be produced.
- 5 Aluminium and Calcium.—Dissolve 2 g in 40 ml of water, add 5 ml of dilute ammonia solution and 5 ml of ammonium oxalate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced
- 6 Alkalis.—Ignite 1 g in 2 porcelain crucible fitted with a lid, extract the residue with 3 ml of water and filter. Evaporate the filtrate and ignite the residue gently. Treat the residue with 20 ml of hot water, filter, evaporate and ignite. Not more than 5 mg should be obtained
- 7 Assay.—Dissove 0 15 g in 25 ml of water, add 2 g of potassium todide and 10 ml of dilute hydrochlone acid and tutate the liberated todine with N/10 Na.95.02 using starch solution as indicator

1 ml N/10 Na_zS₂O₃ \equiv 0 004202 g (NH₂)₂Cr₂O₂

Not less than 99 5 per cent should be indicated

ANALAR

AMMONIUM DIHYDROGEN PHOSPHATE

NH.H.PO. = 115 04

Maximum Limits of Impurities

Reaction	#H 4 2 to 4 4
Chloride (Cl)	o coos per cent
Sulphate (SO ₄)	oot per cent
Nitrate (NO ₂)	o oor per cent
Lead (Pb)	o oor per cent
Iron (Fe)	0 002 per cent
Alkalıs (Na)	0.05 per cent
Arsenic (As ₂ O ₃)	o coor per cent
	(* Dart per million)

- I Description Colourless crystals or a crystalline powder
- 2 Solubility -Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —The reaction of a solution of 1 g in 100 ml of water should be between the limits of pH 4 2 and 4 4 using bromocresol green as indicator.
- 4 Chloride Dissolve 2 g in 45 ml of water and add 5 ml of dilute nitric and and 1 ml of silver nitrate solution No opalescence should be produced
- 5 Sulphate Dissolve 25 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 2 ml of bartum chloride solution and allow to stand for 2 hours. No turbidity or precipitate should be produced
- 6 Nitrate—Dissolve 2 g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphuric send and heat to boiling. The blue colour should not entirely disppear
- 7 Lead—Dissolve 7 g in 30 ml of water and 15 ml of dilute ammonia solution add 1 ml of potassium eyanide solution dilute with water to 50 ml and add 2 drops of sodium sulphide solution. Any colour produced should not be greater than that produced by adding 2 drops of sodium sulphide solution to 50 ml of an aqueous solution containing 2 g of the sample 15 ml of dilute ammonia solution 1 ml of potassium cyanide solution and 5 ml of standard lead solution (1 ml. == 00 tmg Pb).
- 8 Iron Dissolve I g in 10 ml of water, add 3 ml of dulute hydrochloric acid and x drop of N/to KMnO₄, mix, add 5 ml of am monium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcobol and amyl acetate, abake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that

produced by treating 2 ml of standard iron solution (1 ml = 0 o1 mg Fe) in the same manner

- 9 Alkalis —Dissolve 2 g in 50 ml of water, add 4 ml of dilute ammonia solution, heat to boiling, add a solution of 10 5 g of lead acetate dissolved in 20 ml of water and allow to stand for 5 minutes Filter, remove the excess of lead from the filtrate by means of hydrogen sulphide, again filter, evaporate the filtrate to dryness, and ignute the residue gently. Moisten with sulphiure acid, reignite and weigh. The weight of the residue, after deducting that due to alkali in the lead acetate, should not exceed 3 mg.
- to Arsenic.—Dissolve 5 g in 50 ml of water, add 12 ml of stannated hydrochloric acid and test as described in appendix 4. Any stam produced should not be greater than 10 005 mg. standard stam
- 11 Assay Dissolve 3 5 g in 100 ml of water and 20 ml of sodium hydrovide solution. Distil, collect the distillate in 50 ml of N/i H_bSO_4 and titrate the excess of acid with N/i NaOH using methyl red as indicator.

Not less than 98 per cent and not more than 101 per cent should be indicated

ANALAR AMMONIUM FLUORIDE

 $NH_4F = 3704$

Maximum Limits of Impurities

Acid Fluoride (NH4F HF)	O i per cent
Non-volatile Matter	0 02 per cen
Chloride (Cl)	o oor per cen
Sulphate (SO.)	oor per cen
Silica (SiO ₂)	0 2 per cen
Heavy Metals (Pb)	0 004 per cen
Iron (Fe)	0 002 per cen

- I Description —Moist white crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Acid Fluoride —Dissolve 5 g in 50 ml of carbon dioxide free water and titrate to pH 6 6 with N/10 NaOH using bromothy mol blue as indicator Not more than 10 ml of N/10 NaOH should be required.
- 4 Non-volatile Matter.—Mossten 5 g with 2 drops of sulphunc acid and ignite gently. Not more than 1 mg of residue should be left 5 Chloride.—Dissolve 2 g in 50 ml of water and add 1 ml of
 - (Continued overleaf)

AMMONIUM FLUORIDE—continued

dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced

- 6 Sulphate—To 2 g add o 2 ml of N/1 N5₄CO₃ and 6 ml of hydrochloric acid and evaporate to dryness in a platinum dish on a water bath, dissolve the residue in 10 ml of water and 1 ml of N/1 HCl filter if necessary and add 1 ml of barum chloride solution. Any turbulity produced should not be greater than the "standard turbidity" defined in appendix 2.
- 7 Silica—Dissolve 2 g in 10 ml of water, add 5 ml of a 20 per cent aqueous solution of potassium chloride and 10 ml of 90 per cent alcohol allow to stand in a platinum dish for 5 minutes and then transfer to a test tube and examine immediately. No niribidity should be produced
- 8 Heavy Metals and Iron—Dissolve 0.5 g in 45 ml of water and 5 ml of dilute armonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2.

ANALAR AMMONIUM FORMATE

H COONH. = 61 06

Maximum Limits of Impurities

ATT 6 = 10 = 4

Non volatile Matter	0 02 Pt	t cent
Chloride (CI)	0 002 P	r cent
Sulphate (SO ₄)	0 005 P	r cent
Lead (Pb)	0 0002 pc	r cent
Iron (Fe)	0 0005 pc	r cent

- I Description Colourless deliquescent crystals
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—The reaction of a solution of 1 g in 10 ml of carbon dioxide free water should lie between the limits pH 6 5 to 7 z using bromothymol blue as indicator
- 4 Non-volatile Matter Moisten 5 g with sulphuric acid and ignite gently Not more than 1 mg of residue should be left
- 5 Chloride—Dissolve 5 g in 35 ml of water and add 15 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opalescence, defined in appendix 2
- 6 Sulphate —Dissolve 2 g in 10 ml of water, add 0 2 ml of N/1 Na₂CO₃ evaporate to dryness and ignite gently under conditions which

will not introduce sulphur Dissolve the residue in 10 ml of water, add 5 ml of hydrogen peroxide (20 volumes), boil, cool, add 5 ml of N/1 HCl and filter To the filtrate add 30 ml of water and 1 ml of barnum chloride solution and allow to stand for one hour No turbidity or precipitate should be produced

- 7 Lead.—Dissolve 12 g in 30 ml of water, add 5 ml of dilute am monia solution and 1 ml of potassium cyanide solution. Dilute with water to 50 ml and add 2 drops of sodium sulphide solution. Any brown colour produced should not be deeper than that produced by the addition of 2 drops of sodium sulphide solution to 50 ml of an aqueous solution containing 2 g of the sample 5 ml of dilute ammonia solution, 1 ml of potassium cyanide solution and 2 ml of standard lead solution (1 ml = 0 or mg Pb)
- 8 Iron —Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 9 Assay.—Dissolve 25 g in 50 ml of water, add 10 ml of neutral formaldehyde solution and titrate with N/1 NaOH using phenolphthalein as indicator

1 ml N/1 NaOH = 0 06306 g H COONH4

Not less than 97 per cent should be indicated

ANALAR AMMONIUM MOLYBDATE

 $(NH_4)_4M_{07}O_{24} + H_2O = 1236 o$

Maximum Limits of Impurities

Chloride (Cl) 0 005 per cent Sulphate (SO₄) 0 01 per cent Phosphate (PO₄) 0 001 per cent Heavy Metals and Iron passes test

- 1 Description.—White crystals or crystalline masses, sometimes with a greenish or yellowish tint
- 2 Solubility.—Dissolve 5 g in 15 ml of water and 5 ml of dilute ammonia solution. A clear solution should be obtained
- 3. Chloride—Dissolve 2 g m 50 ml of water and add 1 g of citric acid, 0 r ml of dilute mitric acid and 1 ml of silver mitrate solution. No opalescence should be produced
- opalescence should be produced

 4 Sulphate Dissolve 5 g in 50 ml of water, add 5 g of citric acid, o i ml of dilute hydrochloric acid and i ml of barum chloride

AMMONIUM MOLYBDATE—continued

solution and allow to stand for I hour No turbidity or precipitate should be produced

- 5 Phosphate —Pour the solution from Test No 2 into 75 ml of dilute nitric acid and allow to stand at about 40° for 6 hours. No yellow precipitate should be produced.
- 6 Heavy Metals and Iron—Dissolve 1 g in 45 ml of water, add 5 ml of sodium hydroude solution, 2 ml of dilute ammonia solution and 1 drop of sodium sulphide solution. No darkening in colour should be observed
- 7 Assay —Set up a Jones reductor and reactivate the amalgam by passing a mixture of 40 ml of dilute sulphure acid and 60 ml of water through the column followed by 100 ml of water
- (a) Blank —Introduce 25 ml of acid ferric ammonium sulphate solution a into the receiver flash of the reductor, pass 200 ml of N/1 H₂SO₄ through the column, followed by 100 ml of water, add 5 ml of phosphone acid to the contents of the receiver and titrate with N/10 KMnO₄.
- (b) Determination—Introduce 25 ml of each ferric ammonium subphate solution into the receiver run 100 ml of N/t H₂SO₄ through the column followed by a solution of 0 i g of the sample in 80 ml of water and 20 ml of dilute sulphuric each. Then run through 100 ml of N/t H₂SO₄ followed by 100 ml of water Add 5 ml of phosphoric act the contents of the receiver, utrate with N/to kMnO₄ and deduct the value of the blank.

r ml N/10 KMnO. - 0 00180 g MoO.

Not less than 81 per cent. MoO, should be indicated

ANALAR

AMMONIUM NITRATE NH.NO. = 80.05

MU*MO* = 00 02

Maximum Limits of Impunities

Reaction	pu not less than 4 s
Non volatile Matter	oor per cent
Chloride (Cl)	6 0004 per cent
Sulphate (SO ₄)	o ot per cent
Nitrite (NO.)	e eoos per cent
Phosphate (PO ₄)	g goos per cent
Thiocyanate (SCN)	o oor per cent
Heavy Metals (Pb)	o ooo2 per cent
Iron (Fe)	o coor per cent

Acid ferric ammon um sulphate solut on contains 250 g of ferric ammonium sulphate and 250 ml of sulphuric acid in z litre

- I Description.-Colourless crystals or a crystalline powder
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—The reaction of a solution of 1 g in 10 ml of carbon dioxide free water should rot be less than pH 45, using bromocresol green as indicator
- 4 Non-volatile Matter.—Moisten 10 g with 0 5 ml of sulphuric acid and ignite gently Not more than 1 mg of residue should be left.
- 5 Chloride.—Dissolve 5 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of siver nitrate solution. No opalescence should be produced.
- 6 Sulphate.—Dissolve 5 g in 50 ml of water, add i ml of dilute hydrochloric acid and i ml of barium chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced.
- 7 Nitrite.—Dissolve i g in 25 ml of water and add i ml of dilute sulphuric acid and i ml of m-phenylenediamine sulphate solution No vellow or brown colour should be produced
- 8 Phosphate Dissolve 2 g in 20 ml of water, add 3 ml of dilute sulphuric acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60 for 10 minutes. Any blue colour produced should not be deeper than the 'standard colour' defined in appendix 2
- o Thiocyanate.—Dissolve 5 g in 40 ml of water, add 0.5 ml of cupne sulphate solution and 0.5 ml of pyridine and mix, then add 5 ml of chloroform, shake vigorously and allow to separate The chloroformic layer should not be coloured yellow or green
- to Heavy Metals and Iron.—Dissolve to g in 45 ml of water, add 5 ml of didute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 11 Assay.—Dissolve 3 g in 50 ml of water, add 20 ml of neutral formaldehyde solution and utrate with N/1 NaOH to pH 8-2 using phenol red as indicator
 - $1 \text{ ml N/1 NaOH} \equiv 0.08005 \text{ g NH₄NO₃}$

Not less than 98 per cent should be indicated

ANALAR

AMMONIUM OXALATE

(COONH4)2H4O = 142 12

Maximum Limits of Impurities

Reaction			pH 6 0	to 70
Sulphated Ash			0 02	per cent
Chloride (CI)			0 002	per cent
Sulphate (SO ₄)			0 01	per cent
Nitrate (NO ₂)			0 002	per cent
Heavy Metals (Pb)			0 001	per cent
Iron (Fe)			0 0005	per cent
Calcium (Ca)			0.003	per cent

- 1 Description,-Colourless crystals
- 2 Solubility,—Dissolve 5 g in 50 ml. of hot water A clear colourless solution should be produced
- 3 Reaction.—The reaction of a solution of 1 g in 40 ml of carbon dioxide-free water should be between the hmits of \$211 6 0 and 70, using bromothymol blue as indicator
- 4 Sulphated Ash Moisten 5 g with 0 5 ml of sulphune and and ignite gently Not more than 1 mg of residue should be left
- 5. Chloride.—Dissolve I g in 45 ml of warm water and add 5 ml of dilute nitric acid and 0 I ml of silver nitrate solution. No opalescence should be produced
- 6 Sulphate—Dissolve 1 g in 20 ml of water, add 1 g of anhydrous sodium carbonate, evaporate to dryness and ignite under conditions that will not introduce sulphur. Dissolve the residue in 25 ml of hot water, add 5 ml of hydrogen peroude (20 volumes), bod, cool, add 6 ml of ditthe hydrochloric acid and filter. To the filtrate add 30 ml of water and 2 ml of banum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 7 Nitrate.—Dissolve 1 g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphume and and heat to boiling. The blue colour should not entirely disappear.
- 8 Heavy Metals and Iron.—Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammona solution and pass hydrogen sulplude through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2.
- 9 Calcium.—Dissolve 10 g 10 200 ml of hot water, allow to stand for 30 munutes, filter, wash, dry any insoluble matter and weigh. Not more than 1 mg should be obtained.

10 Assay.—Dissolve 0.3 g in 50 ml of water, add 5 ml of sulphure acid and titrate with $N/10~{\rm KMnO_4}$ at a temperature of about 60°

1 ml N/10 KMnO₄ \equiv 0 007106 g (COONH₄)₂ H₂O

Not less than 90 per cent should be indicated

ANALAR AMMONIUM PERSULPHATE

(NH4),S,O, = 228 21

Maximum Limits of Impurities

Non-volatile Matter	or r	er cent
Chloride (Cl)	0 001 1	er cent
Heavy Metals (Pb)	0 002 1	er cent
Iron (Fe)	0 001 1	er cent
Manganese (Mn)	0.0001	ser cent

- 1 Description.-White granular crystals or a crystalline powder
- 2 Solubility,—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Non-volatile Matter.—Ignite 5 g gently, not more than 5 mg of residue should be left
- 4 Chloride Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 0.2 ml of silver nitrate solution. No opalescence should be produced
- 5 Heavy Metals and Iron.—Boil I g with 10 ml of dilute hydrochloric acid until the volume 1s reduced to 5 ml, cool, add 30 ml of water, 15 ml of dilute ammons solution and pass hydrogen sulphide through the solution for a few seconds was not produced should not be deeper than the "standard colours" defined in appendix 2
- 6 Manganese.—Dissolve 5 g m a maxture of 10 ml of dilute subplusive acid, 10 ml of dilute ammonia solution, 3 ml of dilute nutre acid and 1 ml of silver nitrate solution previously heated to 90°, keep at that temperature for 1 minute and then cool rapidly. No pink colour should be produced.
- 7 Assay.—Dissolve 0.5 g of the finely powdered material in a solution of 0.5 g of ferrous sulphate, 3 g of potassium rodide, 25 ml of dilute sulphure and and 25 ml of water, allow to stand for 30 minutes and titrate the liberated rodine with N/10 Na25.0, Carry out a blank titration without the persulphate and make the necessary correction

1 ml N/10 Na2S2O2 = 0 01141 g (NH4).S2O4

Not less than 98 per cent, should be indicated

ANALAR

AMMONIUM PHOSPHATE

(NH₄)₄HPO₄ = 132'07

Maximum Limits of Impurities

Reaction -	pH 7 8 to 8 2
Chloride (CI)	0 0005 per cent
Sulphate (SO ₄)	0 OI per cent
Nitrate (NO ₂)	o oot per cent
Lead (Pb)	0 001 per cent
Iron (Fe)	o ooi per cent
Alkalıs (Na)	0 03 per cent
Arsenie (As ₂ O ₄)	o coor per cent
	/ 1 11 1

(I part per million)

- Description.—Colouriess crystals or a white crystalline powder
 Solubility.—Dissolve 5 g in 50 ml of water A clear colouriess
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourles solution should be produced
- 3 Reaction.—The reaction of a solution of 1 g in 100 ml of carbon dioxide-free water should lie between the limits of pH 78 and 8 2, using cresol red as indicator
- 4 Chloride.—Dissolve 2 g in 45 ml of water and add 5 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 5 Sulphate Dissolve 25 g in 50 ml of water, add 5 ml of dilute hydrochione acid and 2 ml of barium chloride solution and allow to stand for 2 hours. No turbudity or precipitate should be produced
- 6 Nitrate.—Dissolve 2 g in 10 ml of water, add 1 ml of standard indigo solution and 1 or sulf purpure and and heat to boiling. The blue colour should not entirely disappear.
- 7 Lead Dissolve 7 g in 30 ml of water and 15 ml of dilute ammonia solution, add 1 ml of potassum cyanide solution, dilute with water to 50 ml and add 2 drops of sodium sulphide solution. Any colour produced should not be greater than that produced by adding 2 drops of sodium sulphide solution to 50 ml of an aqueous solution containing 2 g of the sample, 15 ml of dilute ammonia solution, 1 ml of potassum cyanide solution and 5 ml of standard lead solution (1 ml = 0 ort mg Pb).
- 8 Iron.—Dissolve I g m 10 ml of water, add 3 ml of dilute hydrochloric acid and 1 drop of Nfto KMnO₂, mix, add 5 ml of ammonium thiocyanate solution and to ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 ot mg. Fe) in the same mannet

- 9 Alkalis Dissolve 2 g m 50 ml of water, heat to boiling, add a solution of 95 g of lead acetate m 20 ml of water and allow to stand for 5 minutes Filter, and remove the excess of lead from the filtrate by means of hydrogen sulphide, again filter, evaporate the filtrate to dryness, and ignite the residue gently Moisten with sulphinic acid and reignite. The weight of the residue, after deducting that due to alkalis in the lead acetate, should not exceed 2 mg
- 10 Arsenic.—Dissolve 5 g in 50 ml of water, add 12 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than a 0 005 mg standard stain

11 Assay —Dissolve 5 g in 50 ml of water and titrate with N/r HCl using bromophenol blue as indicator

1 ml N/1 HCl = 0 1321 g (NH4)2HPO4

Not less than 97 per cent and not more than 102 per cent should be indicated

ANALAR AMMONIUM SULPHATE

 $(NH_4)_2SO_4 = 132 15$

Maximum Limits of Impurities

Reaction .	 pH not less than 4 5
Non volatile Matter	o o2 per cent
Chloride (Cl)	o coog per cent
Nitrate (NO ₂)	o ooz per cent
Phosphate (PO ₄)	o cor per cent
Thiocyanate (SCN)	o cor per cent
Heavy Metals (Pb)	o coo4 per cent
Iron (Fe)	o cooz per cent
Arsenic (As ₂ O ₃)	o coor per cent
	(1 part per million)
Moisture	04 per cent

- Description —A white crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—The reaction of a solution of 1 g in 10 ml of carbon dioxide free water should not be less than $p{\rm H}$ 45 using bromocresol green as indicator
- 4 Non-volatile Matter.—Ignite 5 g gently, not more than r mg of residue should be left
- 5 Chloride—Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric and and 1 ml of silver natrate solution. No opalescence should be produced

AMMONIUM SULPHATE-continued

- 6 Nitrate.—Dissolve i g in io ml of water, add i ml of standard indigo solution and io ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 7 Phosphate —Dissolve I g in 20 ml of water, add 3 ml of dilute sulphunc acid, I ml of phosphate reagent No I and I ml of phosphate reagent No I and I ml of phosphate reagent No I am I ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes Any blue colour produced should not be deeper than the "standard colour" defined in appendix 2
- 8 Thiocyanate Dissolve 5 g in 40 ml of water, add 0 5 ml of cupric sulphate solution and 0 5 ml of pyridine and mix, then add 5 ml of chloroform, shake vigorously and allow to separate The chloroforme
- layer should not be coloured yellow or green
- 9 Heavy Metals and Iron—Dissolve 5 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 10 Arsenic.—Dissolve 5 g in 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0.005 mg standard stain
- 11 Moisture -Dry 5 g at 100° for 1 hour The loss in weight should not exceed 20 mg
- 12 Assay.—Dissolve 2 g of the dried material from Test No 11 in 50 ml of water add 20 ml of neutral formaldehyde solution allow to stand for 10 minutes and titrate with N/1 NaOH to pH 8 2 using phenol red as indicator.

r ml N/r NaOH ≡ 0 06607 g (NH₄)₂SO₄

I mi N/I NaOH ≡ 0 00007 g (NH₄)₂50 Not less than 99 per cent should be indicated

ANALAR

AMMONIUM SULPHIDE SOLUTION

Maximum Limits of Impurities

Non-volatile Matter Carbonate (CO₂) oot per cent

- carbonate (CO₃) 0005 per cent

 Description.—A clear yellow liquid with an ammoniacal odour
- 2 Non-voiatile Matter.—Evaporate ro ml to dryness and ignite gently Not more than r mg of residue should be left
- 3 Carbonate.—To 10 ml add 3 ml of calcium chloride solution and allow to stand in a closed vessel for 1 hour. No precipitate should be produced
- 4 Assay —Mix 5 ml with 10 ml of dilute ammonia solution, add this to 23 5 ml of cupric sulphate solution, and filter. The filtrate should not be coloured blue, indicating the presence of not less than 8 per cent w/v of hydrogen sulphide.

ANALAR AMMONIUM TARTRATE

(CHOH COONH₄)₂ = 184 15

Maximum Limits of Impurities

Free Acrd 2 o ml N/1 per cent
Sulphated Ash 0 05 per cent
Chlorade (Cl) 0 001 per cent
Sulphate (SO₄) - 002 per cent
Lead (Pb) 0 0002 per cent
Iron (Fe) 0 0002 per cent
Arsenic (As₂O₄) 0 0001 per cent
(1 part per million)

- I Description —Colourless crystals or a crystalline powder
- 2 Solubility —Dissolve 5 g m 50 ml of water A clear colourless solution should be produced
- 3 Reaction.—Dissolve 5 g in 50 ml of cold water, the solution should have a pH value of 6 8 or should not require more than 1 o ml of N/10 NaOH to produce this reaction
- 4 Sulphated Ash Ignite 5 g gently, moisten the residue with sulphure scid and reignite Not more than 25 mg of residue should be left
- 5 Chloride Dissolve I g in 50 ml of water and add 2 ml of dilute nitric and and I ml of silver nitrate solution. No opalescence should be produced
- 6 Sulphate—Dissolve 2 g in 40 ml of water, add 5 ml of dilute hydrochloric acid and 5 ml of barium chloride solution and allow to stand for 1 hour. No turbulty or precipitate should be produced
- 7 Lead —Dissolve 12 g in 40 ml of water, add 5 ml of dilute minomia solution and 1 ml of potassium cyanide solution dilute with water to 50 ml and add 2 drops of sodium sulphide solution. Any brown colour produced should not be greater than that produced by the addition of 2 drops of sodium sulphide solution to 50 ml of solution containing 2 g of the sample, 5 ml of ulture ammona solution, 1 ml of potassium cyanide solution and 2 ml of standard lead solution (r ml = 00 r mg Pb).
- 8 Iron—Dissolve 5 g in 12 ml of dilute hydrochloric acid, add 1 drop of N/10 kMinO₄ and mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 2 ml of standard iron solution (1 ml = 0 or mg. Fe) in the same manner.

AMMONIUM TARTRATE-continued

- 9 Arsenic.—Dissolve 5 g m 50 ml of water, add 15 ml of stannated hydrochloric end and test as described in appendix 4 Any stain produced should not be greater than 20 005 mg standard stain
- 10 Assay —Dissolve 4 g in 100 ml of water, add 10 ml of neutral formaldehyde solution and titrate with N/1 NaOH using phenol phthalein as indicator.

 $r ml N/r NaOH \equiv 0.09208 g (CHOH COONH_s),$

Not less than 98 per cent should be indicated

ANALAR AMMONIUM THIOCYANATE

NH₄SCN = 76 12

Maximum Limits of Impurities

Chloride (CI)	0 005 per cent
Sulphate (SO ₄)	o or per cent
Heavy Metals (Pb)	o coos per cent
Iron (Pe)	o cool per cent
Alkalis (Na)	o oz per cent
Other Sulphur Compounds (S)	tneo 1er cent

- t Description -Colourless deliquescent crystals
- 2 Solubility -- Very soluble in alcohol Dissolve 5 g in 50 ml of water, a clear colourless solution should be produced
- 3 Chloride—Dissolve 1 g in 30 ml of hidrogen perovide (20 volumes) add 1 g of sodium hydrovide, warm genth, and rotate the flask until a vigorous reaction commences. When this has abated add a further 30 ml of hydrogen perovide and boil for 2 minutes, cool and add 10 ml of dilute intire and and 1 ml of silver intrate solution. Any opalescence produced should not exceed that given by 0 5 ml of standard chloride solution (1 ml = 01 mg Cl) in an equal volume of solution containing the quantities of reagents used in the test and treated in the same manner.
- 4 Sulphate —Dissolve 5 g in 50 ml of water add 1 ml of dilute bydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 5 Heavy Metals —Dissolve 5 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 6 fron —Dissolve 6 g in 30 ml of water add 1 ml of dilute hydrochloric acid and 10 ml of a mixture of equal volumes of amyl alcohol

and anyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 g dissolved in 5 ml of water with 1 ml of dilute hydrochlotic acid, 0 5 ml of standard iron solution (1 ml = 0 or mg Fe) and 10 ml of the mixture of amyl alcohol and amyl acctate in the same manner

- 7 Alkalis.—Moisten 5 g with sulphuric acid and ignite gently; again moisten with sulphuric acid and ignite. Not more than 3 mg of residue should be left
- 8 Other Sulphur Compounds.—Dissolve 5 g in 25 ml of water, add a mixture of 20 ml of dilute ammonia solution and 4 ml of silver nitrate solution and warm on a water-bath for 15 minutes. Any brown colour produced should not be greater than that given by adding a few drops of solution sulphide solution to a mixture of 30 ml of water, 20 ml of dilute ammonia solution and 3 ml of N/1000 AgNO₃, and warming on a water-bath for 15 minutes.
- 9 Assay.—Dissolve 03 g in 50 ml of viater, add 5 ml of dilute nutric acid and 50 ml of N/10 AgNO3 and titrate the excess silver with N/10 NH3SCN using ferric ammonium subhate as indicator

1 ml N/10 AgNO3 = 0 007612 g NH4SCN

Not less than 97 per cent should be indicated

AnalaR AMMONIUM VANADATE

 $NH_{\bullet}VO_{\bullet} = 116.99$

Maximum Limits of Impurities

Chlonde (Cl) Sulphate (SO₄) o oos per cent

- 1 Description.—A white crystalline powder
- 2 Solubility.—Slightly soluble in warm water forming a clear yellow solution. One gram should dissolve in 5 ml of didne aminoma solution and 50 ml of warm water to form a clear colourless solution.
- 3 Chloride.—Dissolve o 5 g in 50 ml of warm water, saturate with sulphur dioxide and add 2 ml of dilute sulphure acid and 0 i ml of silver mirate solution. No opalescence should be produced
- 4 Sulphate —Dissolve 1 g in 50 ml of warm water, add 2 ml of distinct hydrochlorne acid and 15 g of hydroxylamine hydrochlornde and warm to 60° for 3 munutes, cool, add 1 ml of barum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced

AMMONIUM VANAD 47 E-continued

5. Assay.—Dissolve 0.5 g m 30 ml of water, add 5 ml of dilute sulphuric acid, warm on a water-bath and pass sulphur dioxide through the solution until reduction is complete and the solution is bright blue Remove the excess of sulphur dioxide by boiling gently in a current of carbon dioxide, cool and titrate with N/10 KMnO.

I ml N/10 KMnO, = 0 0117 g NH.VO.

Not less than 98 5 per cent should be indicated.

ANALAR

AMYL ACETATE

· CH, COOC.H., == 130 18

Maximum Limits of Impurities

Free Acid omi N/1 per cent Non-volatile Matter o or per cent Water o 5 per cent

1. Description .- A clear colourless liquid with a characteristic odour

- z Solubility.-One millilitre should dissolve to a clear solution in a mixture of 10 ml of 90 per cent ethyl alcohol and 10 ml of water, and the further addition of 2 ml of water should produce a turbidity
- 3 Free Acid Dissolve 1 g in 10 ml of alcohol, add 01 ml of phenolphthalein solution and titrate with N/10 KOH. Not more than o I ml of N/10 KOH should be required to produce a pink tint
 - 4 Weight per ml at 20° .- 0 \$70 to 0 \$75 g
- 5 Boiling Range.-Not less than 90 per cent should distil between 136° and 142°
- 6 Non-volatile Matter.-Evaporate 10 ml to dryness on a waterbath Not more than 1 mg of residue should be left
- 7 Water.-Titrate 20 ml of methyl alcohol, electrometrically, with Karl Fischer reagent, then add 20 g of the sample and again titrate with Karl Fischer reagent until a small excess is present and a permanent iodine colour has been established Immediately back titrate this excess, electrometrically, with a standard solution of water in methyl alcohol The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 100 mg of water
- 8 Assay.-Dissolve 2 g m 25 ml of alcohol, add 25 ml of N/r KOH (alcoholic) and boil under reflux for I hour Titrate the excess of alkalı with N/t HCl using phenolphthalein as indicator

1 ml N/1 KOH = 0 1302 g CH, COOC,H11

Not less than 97 per cent should be indicated

ANALAR AMYL ALCOHOL

 $C_1H_{11}OH = 88 \text{ 15}$

Maximum Limits of Impurities

Acidity o 1 ml N/1 per cent
Alkalmity o 1 ml N/1 per cent
Non volable Matter o 0025 per cent

Furfural and Organic Impurities passes test

Oily Impurities

results by Gerber and Rose Gottlieb methods differ by not more than 0 o5 per cent no reaction

o 5 per cent

Bases of Indole Type

- I Description.—A clear colourless or very pale yellow liquid with a characteristic odour Consists principally of iso butyl carbinol
- 2 Solubility —Mix 10 ml with 10 ml of hydrochloric acid A clear solution should be formed which on the addition of 25 ml of water should separate into two layers
- 3 Reaction—Shake 10 ml with 10 ml of carbon dioxide free water. The mixture should be neutral to bromothymol blue or should require not more than 0 1 ml of N/10 NaOH or N/10 HCl to render it so vigorous shaking being employed during the titration
 - 4 Weight per ml at 20' -0 809 to 0 812 g
- 5 Boiling Range -Not less than 90 per cent should distil within two degrees in the range 128° to 132°
- 6 Non-volatile Matter—Evaporate 25 ml to dryness on a waterbath Not more than 0.5 mg of residue should be left
- 7 Furfural and Organic Impurities Mix carefully 5 ml with 5 ml of sulphuric acid keeping the mixture cool. Not more than a yellow or light brown colour should be produced.
- 8 Oily Impurettes—Add r ml to a maxture of ro ml of sulphure acad (sp gr 180-182) and rt ml of milk contained in a Gerber butyrometer tube, max thoroughly and centrifuge at 1000 revolutions per minute for 5 minutes. Place the tube in a water bath at 65° for a few minutes and read off the percentage of fat. The percentage of fat indicated should not differ by more than 0 of from a direct determination of the fat by the standard Rose Gortlieb method.
- 9 Bases of Indole Type —Add 3 ml to a mixture of 4 ml of water, 02 ml of a saturated aqueous solution of potassium persulphate and 2 ml of a solution of 0 1 g of p-dimethylaminobenzaldehyde in

(Continued overleaf)

AMYL ALCOHOL-continued

2 ml of hydrochloric 2eid and 10 ml of absolute alcohol. Shake and allow to separate. No pink colour should develop within 10 minutes.

10 Water.—Titrate 20 ml of methyl alcohol, electrometrically, with Karl Fischer reagent, then add 20 g of the sample and again utrate with Karl Fischer reagent until a small excess is present and a permanent indirection of the color of the color of the color of the color of the electrometrically with a standard solution of water in methyl alcohol The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 10 mg of year.

ANALAR

AMYL ALCOHOL

(Pyridine and Nitrogen Free)

 $C_sH_{11}OH = 88 \text{ rs}$

Maximum Limits of Impurities

Aendry o s ml N/s per cent
Alkalimty o s ml N/s per cent
o r ml N/s per cent
o coas per cent
Furfural and Organic Impunities
Olly Impunities
passes test
passes of Indole Type
no reaction

Water
Pyridine and Organic Bases (N)

No Feature

0 4 per cent
0 0007 per cent

This should pass the following test in addition to those in the preceding monograph

Pyridine and Organic Bases —Shake 50 ml with 20 ml of N_{15}^{l} H₂SO₄, separate the catch dayer and repeat the shaking with a second 20 ml of N_{15}^{l} H₂SO₄ and ogain separate the acid layer. Mix the acid liquids, add 5 ml of sodium hydroxide solution, distill and collect the distillate in 10 ml of N_{10} HCl. Thrate the excess of acid in the distillate with N_{10} NaOH should be required by 75 ml of N_{10} NaOH should be required.

ANALAR AMYL NITRITE

 $C_sH_{11}ONO = 117 15$

Maximum Limit of Impurity

o or per cent

- r Description.—A clear pale yellow mobile liquid with a characteristic odour
- 2 Solubility.—Insoluble in water Miscible in all proportions with alcohol
 - 3 Weight per ml at 202 .- 0 865 to 0 875 g
- 4 Boiling Range.—Not less than 90 per cent should distil between 90° and 100°
- 5 Non-volatile Matter.—Evaporate to ml to dryness on a water-bath Not more than 1 mg of residue should be left * 1 1 1 1 1 1 1
- 6 Assay.—Treat 0.5 g with 10 ml of alcohol in a stoppered flask, add 20 ml of N/10 AgNO₃ 1.5 ml of a cold saturated solution of potassium chlorate and 5 ml of nitric acid. Mix, shake vigorously during 5 minutes, filter and wash the filter with water. Titrate the excess of silver in the filtrate and washings with N/10 NH₄SCN using ferric ammonium sulphate as indicator.

1 ml N/10 AgNOa = 0 03514 g CsH11ONO

Not less than 90 per cent should be indicated

ANALAR ANILINE

 $C_4H_5 NH_1 = 93 12$

Maximum Limits of Impurities

Hydrocarbons and Nitrobenzene Non-volatile Matter no reaction o oos per cent

- r Description.—A clear only liquid, almost colourless when freshly distilled, darkening to a reddish-brown colour on keeping
- 2 Solubility (Hydrocarbons and Nutrobenzene) —Dissolve 5 ml in a maxime of 13 ml of diante hydrochione and and 10 ml of where The warm solution should have no odour of nutrobenzene and on cooling to 10° no turbidity should be produced.
 - 3 Weight per ml. at 202-1 021 to 1 023 g
 - 4. Freezing Point -Not below -8°
- 5 Boiling Range.—Not less than 95 per cent should distributiveen 182° and 184°
- 6 Non-volatile Matter.—Evaporate 10 ml to dryness and ignite gently. Not more than 0 5 mg of residue should be left

ANALAR ANTIMONY POTASSIUM TARTRATE

KSbO C.H.O. = 324 02

Maximum Limits of Impurities

 Free Adad
 2 0 ml N/t per cent

 Free Alkalı
 2 0 ml N/t per cent

 Lead (Ph)
 0 0005 per cent

 Arsenic (As₂O₂)
 0 001 per cent

 (10 parts per million)
 0 1 per cent

 Moisture
 0 1 per cent

I Description -A white crystalline powder

- 2 Solublity.—Dissolve 1 g in 20 ml of water a clear colourless solution should be produced
- 3 Reaction Dissolve 1 g in 50 ml of water The solution should have a pH of 4 5, bromocresol green being used as indicator, or should not require more than 2 rol of either N/100 HCl or N/100 NaOH to produce this reaction
- 4 Lead Dissolve 2 g m 42 ml of water, add 7 ml of sodium hydroxide solution and 1 ml of potensium cyanide solution, mx and add 2 drops of sodium sulphide solution. Any colour produced should not be greater than that given by the addition of 2 drops of sodium sulphide solution to 50 ml of 3 solution containing 1 g of the antimony potassium carrate, 7 ml of sodium hydroxide solution, 1 ml of potassium cyanide solution and 0 5 ml of standard lead solution (1 ml = 0 01 mg Pb)
- 5 Arsenic—Dissolve I g in 26 ml of 20 per cent hydrochloric acid adid o r ml of stammous chloride solution and distil 20 ml Wash the flask and condenser, return the distillate to the flask add r drop of stammous chloride solution and redsail 16 ml. To the distillate add 45 ml of water and 2 drops of stammous chloride solution and test as described in appendix 4. Any stam produced should not be greater than a 0 of mg standard stam.
- 6 Moisture.—Dry 5 g at 100° for 1 hour The loss in weight should not exceed 5 mg
- 7 Assay.—Dissolve 0.8 g of the dried material from Test No 6 in 50 ml of water, add 5 g of sodium potassium tartrate and 1 g of sodium potassium tartrate and 1 g of sodium potarbonate and titrate with Nipo I

I ml N/10 I = 0-016246 g KSbO CallaO.

Not less than 99 9 per cent should be andicated

AnalaR

ANTIMONY TRICHLORIDE

SbCl₃ = 228 13

Maximum Limits of Impurities

- I Description —Coloutless crystals fuming in moist air
- 2 Solubility.—Very soluble in absolute alcohol and in chloroform forming solutions which are not more than slightly turbid. Dissolve 5 g in 20 ml of dulte hydrochloric acid and 30 ml of water, a clear colourless solution should be produced.
- 3 Iron.—Shake 1 g with 25 ml of water until decomposed, filter and wash with 5 ml of water. Evaporate the filtrate to about 1 ml, add 1 ml of dilute hydrochloric acid and sufficient water to produce 10 ml and then N150 KM100, drop by drop until a pink colour persists for 5 seconds. Finally add 5 ml of ammonium thoop anate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 0 5 ml of standard iron solution (i ml = 00 cm g Fe) with 1 ml of dilute hydrochloric acid, 10 ml of water, 1 drop of N/10 KM104, and 5 ml, of ammonium thuocyantee solution and shaking with 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate
- 4 Arsenic.—Dissolve 1 g in 26 ml of 20 per cent hydrochloric acid, add 0 i ml of stannous chloride solution and distul 20 ml , wash the flask and condenser, return the distillate to the flask, add i drop of stannous chloride solution and redust it 6 ml. To the distillate add 45 ml of water and 2 drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a 0005 mg standard stain.
- 5 Assay.—Dissolve 0.5 g in 30 ml of water containing in solution 4 g of sodium potassium tartirate, add 2 g of sodium bicarbonate and turtate with N/10 I

ı ml. N/10 I = 0 o1141 g SbCl3

Not less than 99 per cert should be indicated

ANALAR ARSENIOUS OXIDE

As₂O₂ = 107 82

Maximum Limits of Impurities

 Non volatile Matter
 0 025 per cent

 Sulphude
 no reaction

 Heavy Metals (Pb)
 0 007 per cent

 Iron (Fe)
 0 0005 per cent

 Antimony
 no reaction

 Cadmium
 no reaction

 Tin
 no reaction

- 1 Description -A dense white powder
- 2 Solubility.—Dissolve 2 g in 25 ml of dilute ammonia solution and 25 ml of warm water The solution should not be more than faintly hazy
- 3 Non-volatile Matter.—Ignate 2 g gently in a silica crucible in a fume cupboard. Not more than 0 5 mg of residue should be left
- 4 Sulphide.—Dissolve 5 g in 10 ml of sodium hydrorude solution and 15 ml of water and add 1 drop of lead acetite solution The solution should not darken in colour
- 5 Heavy Metals and Iron.—Pass hydrogen sulphide through the solution obtained in Test No 2 for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 6 Antimony, Cadmium and Tin—Dissolve o 5 g in 50 ml of hot water and 2 ml of dilute hydrochloric acid precipitate with hydrogen sulphide filter and wish with water, suspend the precipitate in 25 ml of water and add 50 ml of ammonium carbonate solution. A clear solution should be produced.
- 7 Assay.—Dissolve 0 + g in 20 ml of water and 2 ml of sodium hydroxide solution, add 25 ml of fullute hydrochloric acid and 5 ml of potassium cyanide solution and intrate with M/20 kl/O, until the dark brown solution which is formed becomes light brown, then add 5 ml of starch solution and continue the tiration until the blue colour disappears

1 ml $M/20 \text{ KIO}_2 = 0.009891 \text{ g As}_2\text{O}_2$

Not less than 99 8 per cent should be indicated

ANALAR

BARIUM ACETATE

(CH₂ COO)₂Ba = 255 45

Maximum Limits of Impurities

Chlonde (CI)	o oog per cent
Nitrate (NO ₂)	o ooz per cent
Heavy Metals (Pb)	o ooz per cent
Iron (Fe)	o out per cent
Alkalis and other Metals (Na)	0 03 per cent

- 1. Description -White crystals or a crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of water. A clear, or not more than faintly hazy, colourless solution should be produced
- 3 Chloride—Dissolve 3 g in 45 ml of water and add 6 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 4 Nitrate.—Dissolve x g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Heavy Metals and Iron—Dissolve 1 g in 45 ml of carbon diovide-free water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 6 Alkalis and other Metals—Dissolve 5 g in 100 ml of water, heat to boiling, add 15 ml of dibite sulphure acid and allow to stand for 2 hours. Filter, evaporate the filtrate to dryness, ignite gently and weigh the residue. Not more than 5 mg should be obtained.
- 7. Assay.—Dissolve 0.2 g in 100 ml of water and 2 ml of dilute acetic acid and add 5 g of ammonium chloride, heat to boiling and add 20 ml of porassium thromate solution slowly with constant sturing. Stand for 2 hours, filter on a sintered glass crucible, wash with cold water and dry at 130°

Weight of BaCrO₄ × 1 0083 = weight of (CH₂ COO)₂Ba Not less than 99 per cent should be indicated

ANALAR BARIUM CARBONATE

BaCO₂ = 197 37

Maximum Limits of Impurities

Acid insoluble Matter

Soluble All-sh

Chloride (Cl)

Nitrate (NO₁)

Nitrate (NO₂)

Nitrate (NO₂)

O cot per cent

o cot per cent

o cot per cent

o cot per cent

lron (Fe)

Alkalia and other Metals (Na)

- 1 Description -A white powder or friable masses
- 2 Acid-insoluble Matter (Sulphate, etc.) —Dissolve 5 g in 15 ml of dilute hydrochloric acid and 50 ml of water. A clear colourless solution should be produced.
- 3 Soluble Alkall —Shake 2 g for 5 manutes with 50 ml of carbon dioxide free water and filter Turate the filtrate with N/100 HCl using phenolphilaleun as indicator Not more than 0 5 ml of N/100 HCl should be required
- 4 Chloride —Dissolve 1 g in 45 ml of water and 5 ml of dilute
 nitric acid and add 1 ml of silver nitrate solution. No opalescence should
 be produced.
- 5 Nitrate—Dissolve 0.5 g in 10 ml of dilute acetic acid add 1 ml of standard indigo solution and 10 ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Heavy Metals and Iron—Dissolve I g in 35 ml of water and 5 ml of dilute hydrochloric acid, buil to expel carbon dioxide, could do in ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined ma spendix z
- 7 Alkalis and other Metals—Dissolve 5 g in 100 ml of water and 20 ml of ditute hydrochloric acid, heat to boiling, add 12 ml of dilute sulphuric acid and allow to stand for 2 hours Editer, evaporate the filtrate to dryness, ignute gently and weigh the residue Not more than 5 mg should be obtained.
- 8 Assay —Dissolve 4 g in 50 ml of N/t HCl and 50 ml of water and titrate the excess of acid with N/t NaOH using bromophenol blue as indicator.

ı ml N/ı HCl ≡ o og869 g BaCO,

ANALAR BARIUM CHLORIDE

BaCl, 2H,O = 244 30

Maximum Limits of Impurities

Nitrate (NO ₃)	0 002	per cent
Heavy Metals (Pb)	0 001	per cent
Iron (Fe)	0 0005	per cent
Calcium and Strontium (as sulphates)	02	per cent
Alkalis and other Metals (Na)	0 03	per cent

- 1 Description -Colourless crystals
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Nitrate.—Dissolve I g in 10 ml of water add I ml. of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 4 Heavy Metals and Iron —Dissolve 2 g in 45 ml of carbon dioxide free water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 5 Calcium and Strontium—Reduce 1 g to fine powder and show that 20 ml of absolute ethyl alcohol for 5 minutes filter evaporate the filtrate to dryness on a water bath mosten the residue with sulphunc and and gently ignite. Not more than 2 mg of residue should be obtained
- 6 Alkalis and other Metals—Dissolve 5 g in 100 ml of water, heat to boiling add 15 ml of dilute sulphuric acid and allow to stand for 2 hours. Filter evaporate the filtrate to dryness ignite gently and weigh the residue. Not more than 5 mg should be obtained.

ANALAR BARIUM HYDROXIDE

Ba(OH), 8H2O - 315 50

Maximum Limits of Impurit es

Chioride (Ci)	o ooz per cent
Sulphate (SO ₄)	o oos per cent
Nitrate (\O ₂)	o oo2 per cent
Sulphide	no reaction
Heavy Metals (Pb)	o co2 per cent
Iron (Fe)	o out per cent
Alkalis and other Metals (Na)	o of per cent
Carbonate (RaCO ₄)	p.s. per cent

(Cont nued overleaf)

BARIUM HYDROXIDE-continued

- Description Moist colourless crystals
- 2 Chloride—Dissolve 5 g in 45 ml of water neutralise with nitric acid add 3 drops in excess and i ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opales cence defined in appendix 2
- 3 Sulphate —Dissolve 2 g in 50 ml of water and 3 ml of dilute hydrochloric acid. A clear colourless solution should be produced
- 4 Nitrate—Dissolve 1 g in 10 ml of dilute acetic acid add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Sulphide.—Dissolve r g in 25 ml of water and add r drop of lead acetate solution. The solution should not darken in colour
- 6 Heavy Metals and Iron—Dissolve 1 g in 35 ml of water and 5 ml of dilute hydrochloric acid Boil to expel carbon diowde cool add 10 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 7 Alkalis and other Metals—Dissolve 5 g in 100 ml of water and 10 ml of dilute hydrochloric acid heat to boiling add 10 ml. of d lute sulphuric acid and allow to stand for 2 hours Filter evaporate the filtrate to dryness ignite gently and we gb the residue. Not more than 10 mg should be obtained.
- 8 Assay and Carbonate —Dissolve 5 g in 100 ml of carbon dioxide free water and titrate with N/1 HCl using phenolphthalein as indicator

Then add a further 2 ml of N/I HCl boil cool and titrate the excess acid with N/I NaOH

Not less than 96 per cent of Ba(OH) SII O and not more than 05 per cent of BaCO₄ should be indicated

ANALAR

BARIUM NITRATE

Ba(NO.). = 261 38

Maximum Limits of Impur ties

THANHAM AMERICA OF E	aspac	
Chloride (CI)	100 0	per cent
Heavy Metals (Pb)		per cent
Iron (Fe)		per cent
Calcium (Ca)	o e 6	per cent
Alkalis and other Metals (\a)	0 03	per cent

Description —Colourless crystals

- 2 Solubility —Dissolve 5 g in 50 ml of warm water A clear colour less solution should be produced
- 3 Chloride Dissolve I g in 50 ml of water and add I ml of dilute nitric and and I ml of silver nitrate solution. No opalescence should be produced
- 4 Heavy Metals and Iron—Dissolve 2 g in 45 ml of carbon dioxide free water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 5 Calcium —Reduce r g to a fine powder and shake with 20 ml of absolute ethyl alcohol for 5 minutes filter evaporate the filtrate to dryness moisten the residue with sulphuric acid and ignite gently. Not more than 2 mg of residue should be obtained.
- 6 Alkalis and other Metals—Dissolve 5 g in 100 ml of water, heat to boiling add 15 ml of didute sulphurus acid and allow to stand for 2 hours Filter evaporate the filtrate to dryness ignite gently and weigh the residue. Not more than 5 mg should be obtained
- 7 Assay Dissolve o.2 g in 100 ml of water and 2 ml of dilute acetic acid add 5 g of ammonium chlonde heat to boiling add 20 ml of potassium chromate solution slowly with constant stirring and allow to stand for 2 hours. Fifter on a sintered glass crucible wash with cold water and dry at 130°

Weight of BaCrO4 × 1 0316 = weight of Ba(NO3)2

Not less than 99 5 per cent should be indicated

ANALAR

BENZALDEHYDE

 C_4H_4 CHO = 106 12

Maximum Limits of Impurities

Sulphated Ash Chlorine (Cl) o oz per cent

- r Description —A colourless or very faintly yellow highly refractive liquid with a characteristic odour
 - 2 Solubility —Miscible with alcohol and with ether
 - 3 Weight per ml at 120° -1 044 to 1 047 g
 - 4 Refractive Index.—n_D 1 544 to 1 547
- 5 Boiling Range —Not less than 95 per cent should distil between 178° and 181°

BENZALDEH \ DI -conti tued

- 6 Sulphated Ash -Evaporate 5 g to dryness on a sand bath, moisten the residue with sulphuric acid and ignite gently. Not more than I me of residue should be left
- 7 Chlorine.—Dissolve I g in 50 ml of amyl alcohol add gradually 2 g of clean sodium metal pellets, warm under reflux until all the sodium has dissolved, and continue refluxing for a further 15 minutes Cool, add 20 ml of water followed by 5 ml of N/10 AgNO, and sufficient nitric acid, added slowly with shaking to produce a clear solution. Filter, wash with water and titrate the filtrate and washings with N/10 NH, SCN from a micro hurette, using ferric ammonium sulphate as indicator. Run a blank on the reagents, omitting the benzaldehyde. The difference between the two titrations should not exceed o 25 ml
- 8 Assay.-Dissolve 2 5 g in 50 ml of hydroxylamine bydrochloride reagent and leave to stand for one hour in a stoppered bottle Add o 4 ml of bromophenol blue solution and titrate with N/2 NaOH to the same blue colour as is exhibited by 50 ml of hydroxylamine hydrochloride reagent which has stood for one hour in a similar vessel. Correct the titration figure for the amount of free acid determined as follows Dissolve g in 25 ml of 00 per cent alcohol, previously neutralised to phenolphthalein, and titrate with N/10 NaOH

r ml N/r NaOH o 1061 g C.H. CHO

Not less than 99 per cent should be indicated

ANALAR BENZENE

 $C_0H_0 = 7811$

Maximum Limits of Impurities

Non-volatile Matter g ooz per cent passes test Organic Impurities Thiophen o ooo2 per cent Sulphur Compounds (CS2) o occ3 per cent Water per cent

- Description.—A clear colourless liquid with a characteristic odour 2 Solubility.-Almost insoluble in water, miscible with alcohol and
- with other forming clear colourless solutions
 - 3 Weight per ml. at 20° .- 0 875 to 0 878 g 4 Refractive Index .- np 1 498 to 1 505
 - 5 Freezing Point-4° to 6°

• Hydroxylamine hydrochloride reagent —Dasonive 14 g of hydroxylamine hydrochloride in 80 ml of 50 per cent alcohol aedd 16 ml of breanophenol blue solution dilute to 100 ml with 50 per cent alcohol and adjust with N/s NaOll to pil 3 8

- 6 Boiling Range.-Not less than 95 per cent should distil between 79 5° and 81°
- 7 Non-volatile Matter.-Evaporate 55 ml to dryness on a waterbath Not more than r mg of residue should be left
- 8 Organic Impurities.-To 5 ml contained in a dry test-tube add 2 ml of sulphuric acid, warm to 40°, agitate with a glass rod for 5 minutes and allow to separate. The acid layer should not be coloured deeper than pale yellow
- 9 Thiophen,-Shake 1 ml with 5 ml of isatin reagent * for 5 minutes and leave to stand for 15 minutes. No blue colour should be produced in the lower layer
- 10 Sulphur Compounds .- Boil 10 ml with 1 ml of absolute alcohol and 3 ml of potassium plumbite solution for 15 minutes under a reflux condenser and allow to stand for a minutes. No darkening should be produced in the aqueous layer
- 11 Water .- Titrate 20 ml of methyl alcohol, electrometrically, with Karl Fischer reagent, then add 20 g of the sample and again titrate with Karl Fischer reagent until a small excess is present and a permanent iodine colour has been established. Immediately back titrate this excess, electrometrically, with a standard solution of water in methyl alcohol The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 20 mg of water

ANALAR BENZIDINE

 $(C_1H_1 NH_2)_2 = 184 23$

Maximum Limits of Impurities

lın

Acid-insoluble Matter Sulphated Ash o oz per cent Chloride (C1) o oor per cent Sulphate (SO₄) oor per cent Organic Impurities passes test Sensitivity passes test Mosture 10 per cent

- I Description.—A white to pale buff crystalline powder
- 2 Solubility.—Readily soluble in alcohol forming a clear solution Dissolve 1 g in 5 ml of dilute hydrachloric acid and 25 ml of water, a clear solution should be produced
 - 3 Melting Point.-128° to 129°
- * Isatin Rengent -Devolve 6 mg of seatm and 6 mg of ferric sulphate in 50 ml of sulphuric seid diluted with 8 ml of water

BENZIDINE-contu ued

- 4 Sulphated Ash —Moisten 5 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Chloride.—Boil 1 g with 3 ml. of dilute nitrie acid and 50 ml of water, cool and filter and to the filtrate add 1 ml of silver nitrate solution No opalescence should be produced
- 6 Sulphate—Dissolve I g in 5 ml of dilute hydrochlone acid and 45 ml of water, add I ml of banum chlonde solution and allow to stand for I hour No turbidity or precipitate should be produced
- 7 Organic impurities—Dissolve o 1 g in 5 ml of glacial acetic acid. The solution should be clear and not more than faintly coloured and on the addition of 5 ml of hydrogen peroxide (10 volumes), no darkening should occur
- 8 Sensitivity —To 2 ml of the solution from Test No 7, add 1 ml of freshly prepared blood solution (1 in 100 000) A blue or greenish blue colour should be produced
- 9 Moisture Dry 2 g at 110° for 1 hour, the loss in weight should not exceed 20 mg

ANALAR

BENZOIC ACID

 $C_9H_8 COOH = 122 12$

Maximum Limits of Impurities

Sulphated Ash	0 02 per cent
Chloride (CI)	o ooo5 per cent
Sulphate (SO ₄)	0 005 per cent
Heavy Metals (Pb)	o opost per cent
Iron (Fe)	o ooo2 per cent
Chlorine Compounds (CI)	ooz percent
Oxygen absorbed (O)	o oz per cent

- I Description —Colourless needle crystals or flakes
 - 2 Solubility—Slightly soluble in water, readily soluble in alcohol and in ether. Five grams should dissolve in 15 ml of dilute ammonia solution and 35 ml of water to form a clear colourless solution.
 - 3 Melting Point,-121° to 122°
 - 4 Sulphated Ash -- Moisten 5 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
 - 5 Chloride—Boil 2 g with 40 ml of water and 1 ml of dilute nitric acid, eool filter by suction and to the filtrate add 10 ml of water and 1 ml of silver nitrate solution. No opalescence should be produced

- 6 Sulphate.—Boil 2 g with 40 ml of water and 1 ml of dilute hydrochloric acid; cool, filter by suction and to the filtrate add 10 ml of water and 1 ml of barum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 7 Heavy Metals and Iron.—Pass hydrogen sulphide through the ammoniacal solution obtained in Test No 2 for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Chlorine Compounds.—Mix 5 g with 3 g of anhydrous sodium carbonate, transfer to a small porcelain crucible and fill the latter completely with more sodium carbonate, well pressed down. Place a small platinum dish upsade down over the crucible and invert the whole quickly Add more sodium carbonate until the inverted crucible is half buried and heat strongly for 30 minutes. Cool and dissolve the mass in an excess of dulute nitre send, add 5 ml of N/10 Ag/NO₄ filter, wash with water and titrate the filtrate and washings with N/10 NII₄SCN. Carry out a blank determination omitting the beizoic acid. The difference between the titrations should not exceed 0.3 ml.
- ad Oxygen Absorption.—Dissolve I g in 100 ml of hot water, and to ml of dilute sulphune acid and iterate with N/10 KMinO. Not more than 0.25 ml should be required to produce a pink colour
- To Assay.—Dissolve 2 g in 10 ml of alcohol, add 30 ml of water and titrate with N/1 NaOH using phenol red as indicator

1 ml N/1 NaOH ≡ 0 1221 g CaHa COOH

Not less than 99 8 per cent should be indicated.

 C_6H_5 CH(OH) C(NOH) $C_6H_5 \approx 227$ 25

Maximum Limit of Impurity

Sulphated Ash

o z per cent

Sensitivity to Copper (Cu) i 100,000 minimum Sensitivity to Molybdenum (Mo) i 200,000 minimum

- 1 Description.—A white crystalline powder
- 2 Solubility.—Almost insoluble in water Dissolve r g in 50 ml of ethyl alcohol A clear colourless solution should be obtained
 - 3 Melting Point-152° to 154°
- 4 Sulphated Ash.—Moisten 1 g with sulphuric acid and ignite gently. Not more than 2 mg of residue should be left
- 5 Sensitivity—(a) Add 1 ml of a 2 per cent alcoholic solution to 50 ml of standard copper solution (1 ml = 0 or mg Cu) rendered (Continued overlat)

a RENZOIN OXIME-contra ed

50

alkaline by the addition of 1 ml of dilute ammonia solution. A green turbidity should be produced immediately

(b) Add o 5 ml of a 2 per cent alcoholic solution to 50 ml of water containing 23 ml of a 602 per cent solution of ammonium molybdate and acidified with 00, ml of ddute sulphuric acid. A white turbidity should be produced within 5 minutes

ANALAR BENZOYL CHLORIDE

 $C_4H_4 COC1 = 140 57$

Maximum Limits of Impurities

Non volatile Matter per cent 0 01 Heavy Metals (Pb) 0 001 per cent fron (Fe) 0 0005 per cent Phosphorus Compounds (P) o cozs per cent Sulphur Compounds (S) 0 001 per cent

- I Description -An almost colourless liquid fuming in moist air
- 2 Solubility -- Insoluble in water Slowly and almost completely soluble in sodium hydroxide solution
- 3 Non-volatile Matter Evaporate 10 g to dryness and ignite gently Not more than 1 mg of residue should be left
- 4 Heavy Metals and Iron -Dissolve 2 ml in 40 ml of water and to ml of dilute ammonta solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the standard colours defined in appendix 2
- 5 Phosphorus Compounds -Boil 1 ml with 1 ml of water and z ml of nitric acid for a minute add 20 ml of water cool and filter, then add 10 ml of ammonium mitro molybdate solution and maintain at about 40° for 2 hours No vellow precipitate should be produced
- 6 Sulphur Compounds -Boil 1 ml with 1 ml of water and 2 ml of nitric acid for 1 minute, 2dd 25 ml of water cool and filter then add 20 ml of water and 1 ml of barrum chloride solution and allow to stand for I hour No turbidity or precipitate should be produced
 - 7 Assay -Dissolve 25 g in 30 ml of pyridine add very slowly 50 ml of water and thrate with Ma NaOII using phen aphthalein as indicator

1 ml N/1 NaOH - 0 07028 g CaH, COCI

Not less than 98 per cent should be indicated. Dilute the neutralised liquid with water to 250 ml and to 50 ml of this solution add 5 ml of nitrie acid and 50 ml of N/10 Ag NO, solution

Filter wash with water and titrate the filtrate and washings with N/10 NH₄SCN using ferric ammonium sulphate as indicator

1 ml N/10 AgNO₃ = 0 01406 g C₅H₃ COCl

Not less than 98 per cent should be indicated

ANALAR

BENZYL-150-THIOUREA HYDROCHLORIDE (S-Benzylthiouronium Chloride)

C.H. CH, S C(NH)NH, HCl = 202 71

Maximum Limit of Impurity

Sulphated Ash

1 Description -White cristals

a t per cent

- 2 Solubility Dissolve 5 g in 50 ml of water. The resulting solution should be not more than faintly turbid and should be acid to methyl red
- 3 Melting-point.—150° to 151° or 176° to 177° (The substance is dimorphic)
- 4 Sulphated Ash -- Moisten 1 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Assay Dissolve 0.5 g in 10 ml of water add 5 ml of dilute nitric acid and 50 ml of N/10 Ag NO₃ filter wash with water and titrate the filtrate and washings with N/10 NH₄SCN using fetric ammonium sulphate as indicator

1 ml N/10 AgNO₃ = 0.02027 g C₂H₁₁N SCI Not less than 98 per cent should be indicated

ANALAR

BERYLLIUM SULPHATE

BeSO, 4H O 1"7 15

Maximum Limits of Impurities

o oot per cent
o oo2 per cent
o oo2 per cent
o oo° per cent
o i per cent
o og per cent
o.t per cent

I Description —Colourless crystals or a white crystalline powder 2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced

(Continued overleaf)

BFRYLLIUM SULPHATE-continued

- 3 Chloride -Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- Nitrate Dissolve 1 g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear
- 5 Lead.—Dissolve 1 g in 50 ml of water, add 1 rol of potassium cyanide solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 6 Iron Dissolve 1 g in in ml of water, add 1 ml of dilute by drochloric acid and I drop of N/10 KMnQ., mix add 5 ml of ammonium thiocyanate solution and to ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 2 ml of standard iron solution (1 ml = 0 or mg Fe) in the same manner
- 7 Aluminium.-Dissolve 1 g in 25 ml of warm water, to 0.05 ml (x drop) of this solution in a watch glass, add 0 05 g of powdered exsium sulphate, stir with a platinum wire and scratch the glass, cover with another watch glass to protect against evaporation. Any turbidity produced after a minutes should not be greater than that produced by adding o of g of powdered cresium sulphate to o of ml of an aluminium ehloride solution containing I me Al in 2 5 ml
- 8 Alkalis and other Metals -Dissolve 2 g in 50 ml of hot water, add to ml of dilute ammonia solution, boil gently for 2 minutes and filter Evaporate 30 ml of the filtrate to dryness and ignite the residue gently Not more than I mg should be obtained
- 9 Ammonia -Dissolve 2 g in 50 ml of water, add 40 ml of sodium hydroxide solution and ilistil 30 ml, collecting the distillate in 10 ml of N/10 H.SO. Titrate the excess of acid with N/10 NaOll using methyl red as indicator Not less than 8 8 ml of N/10 NaOH should be required

ANALAR

BISMUTH NITRATE

 $B_1(NO_1)_1 \circ H_1O = 485 10$

Merimum Limits of Impurities

Chloride (CI)	o oor percent
Sulphate (SO ₄)	ooi percent
Copper (Cu)	o oo2 per cent
Lead (Pb)	oo2 per cent
Iron (Fe)	o oo per cent
Alkalis and other Metals (Na)	o oz per cent
Arsenic (As ₂ O ₂)	o acor per cent
	(1 part per million)

- 1 Description .- Colourless deliquescent crystals with an odour of nitrie acid
- 2 Solubility.-Dissolve 5 g in 45 ml of water and 5 ml of nitric acid A clear colourless solution should be obtained
- 3 Chloride -Dissolve 1 g in 2 ml of dilute nitric acid, dilute with water to 50 ml and add 1 ml of silver natrate solution. No opalescence should be produced

4 Sulphate -Dissolve 1 g in 2 ml of dilute nitric acid dilute with water to 50 ml, add 1 ml of barrum natrate solution and allow to stand

for r hour No turbidity or precipitate should be produced

5 Copper.-Dissolve 1 g in 5 ml of dilute sulphuric acid, add 5 g of citric acid and make just ammoniacal with strong ammonia solution (about 8 ml) Make just acid to litmus with a few drops of acetic acid, adjust the volume to 15 ml and add 05 ml of a 05 per cent alcoholic solution of rubeanic acid. The colour produced after 15 minutes should be no darker than that of a standard containing 2 ml of standard copper solution (1 ml = o or mg Cu) and the quantities of the reagents used in the test

6 Lead .- Dissolve 6 g in 7 ml of nitric acid and 10 ml of water and add the hot solution slowly with vigorous stirring to 35 ml of a 30 per cent w/v solution of NaOH and stir for 5 minutes dilute to 80 ml and filter through a No 41 Whatman paper To 40 ml of the filtrate add nitric acid until the solution is just acid to litmus, then add 5 ml of strong ammonia solution and 2 drops of a 0.2 per cent alcoholic solution of gallein. The colour produced after 15 minutes should show no more blue tint than a standard containing 50 ml of standard lead solution (1 ml == 'oor mg Pb), 5 ml of ammonia solution and 2 drops of the gallein solution

7 Iron.-Dissolve o 1 g in 10 ml of dilute sulphuric acid add 1 ml of hydroxylamine hydrochloride solution (10 per cent) 1 ml of a o 5 per cent aqueous solution of o-phenanthroline and 5 g of ammonium acetate, mix and allow to stand for 5 minutes. Any colour produced should not be greater than that obtained by treating o r ml of standard gron (1 ml = 0.01 mg Fe) dissolved in 10 ml of dilute sulphuric acid, in the same manner

8' Alkalis and other Metals,-Dissolve 2 g in to ml of dilute nitric acid and dilute to 100 ml. Precipitate the bismuth with hydrogen sulphide and filter. Evaporate the filtrate to dryness, moisten with sulphuric acid and ignite. Not more than 1 mg of residue should be obtained

9 Arsenic,-Heat 5 g with 2 ml of sulphunc acid and evaporate until white fumes are evolved, cool add a ml of water and again evaporate to furning Cool add 20 ml of water and 10 ml of stannated hydrochloric acid and distil 15 ml. To the distillate add a few drops of bromine solution, remove the excess of bromine by a few drops of stannous chloride solution, add 40 ml of water and test as described in appendix 4. Any stain produced should not be greater than a o-co5 rog standard stain

10 Assay.—Dissolve 0 5 g in 5 ml of dilute nitric acid dilute to 150 ml with water, add 2 ml of dilute hydrochloric acid then dilute ammonia solution until only faintly acid to litmus paper and allow to stand over

(Continued overleaf)

BISMUTH NITRATE-cont nued

Arsenic (As-O.)

might Filter through asbestos in a Gooch crucible wash with water dry at 110° and weigh the resulting bismuth oxychloride

Weight of BiOCl x 1 862 = weight of Bi(NO₃)₃ 5H₂O

Not less than 98 per cent should be indicated

ANALAR

BORIC ACID

H₂BO₂ == 61 84

o coor per cent

a Description - White crystals powder or flakes

2 Solubility —Dissolve 5 g in 50 ml of hot water A clear colourless solution should be produced

3 Chloride—Dissolve 6 g in 60 ml of boiling water and 1 ml of dilute nitric and cool and filter to 50 ml of the filtrate add 1 ml of silver nitrate solution. No opalescence should be produced.

4 Sulphate —Dissolve 6 g in 60 ml. of boiling water and 1 ml of dilute hydrochlorie acid cool and filter To 50 ml of the filtrate add 1 ml of barium obloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced

5 Heavy Metals and Iron—Dissolve 2 g in 40 ml of water and 10 ml of thinte ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours' defined in appendix 2

6 Calcium — Dissolve 2g in 25 ml of hot water add 15 ml of dilute acetic acid and 5 ml of ammonium oxalate solution and allow to stand for 10 minutes. No turbulity or precipitate should be produced

7 Arsenic.—Dissolve 2 g with 5 g of citric acid in 50 ml of hot water add 10 ml of stanuated hydrochlore acid and test as described in appendix 4 Any stain produced should not be greater than a 0 002 mg standard stain

8 Assay —Dissolve 3 g in a mixture of 50 ml of glycerol and 50 ml of water and titrate with N/t NaOII using phenolphthalein as indicator

1 ml N/1 NaOH = 0 06184 g H₂BO₃

Not less than 99 5 per cent should be indicated

ANALAR BROMINE

Br = 79 916

Maximum Limits of Impurities

Non-volatile Matter	0 01 per cent		
Chlorine (CI)	0 05 per cent		
Iodine (I)	o ooos per cent		
Sulphate (SO ₄)	o oos per cent		
Organic Impurities	no reaction		
Arsenic (As ₂ O ₃)	o ooor per cent		

- Description .- A dark reddish-brown fuming liquid
- 2 Solubility.-Slightly soluble in water Soluble in glacial acetic acid

(1 part per million)

- 3 Non-volatile Matter.—Evaporate 3 ml in a porcelain dish on a water-bath. Not more than 1 mg of residue should be left
- 4 Chlorine.—Shake 3 ml with 0.5 g of zinc filings and 5 ml of water for 10 minutes and heat on a water-bath to remove the excess of bromine. Dissolve the residue in zo ml of water add 85 ml of dilute nitric acid, raise to the boiling point and aspirate air through the hot liquid until the liberated bromine is removed and the higuid so coloritess. Cool, add to ml of N/10 AgNO, filter wash with water and titrate the filtrate and washings with N/10 NH,SCN using ferric ammonium sulphate as indicator. Not less than 8.6 ml of N/10 NH,SCN should be required.
- 5 Iodine—Boil 1 ml with 50 ml of water, 1 ml of N/t H₂SO, and a small fragment of marble until the solution is almost colourless. Cool, add of g of phenol and allow to stand for 2 minutes, then add 0.2 g of potassium iodide and 1 ml of starch solution. No blue colour should be produced.
- 6 Sulphate —Dissolve the residue obtained in Test No 7 in 50 ml of water, and add 1 ml of dilute hydrochloric acid and 1 ml of baruum chloride solution and allow to stand for 3 hours. No turbidity or precipitate should be produced.
- 7 Organic Impurities Shake 1 ml with 30 ml of water and 10 ml of dilute ammonia solution and cool. A clear colourless solution free from only drops should be obtained, and on evaporation to dryness a white residue should be left.
- 8 Arsenic —To 3 ml add o 1 g of anhydrous sodium carbonate and o 5 ml of water and exaporate to dryness on a water-bath Dissolve the residue in 5 om l of water, add to ml of hydrochloric acid and a few drops of stannous chloride solution and test as described in appendix 4 Ann stain produced should not be greater than a 0 or mg standard star.

ANALAR

n-BUTYL ALCOHOL

C4H4OH - 74 12

Maximum Limits of Impurities

Actility 0 05 ml N/1 per cent
Alkalimity 0 05 ml N/1 per cent

Non volstile Matter
Aldehyde and ketones (C₂H,CHO)
Fluorescent Impurities

Water

Ooo5 per cent
oo35 per cent
passes test
0.4 per cent

1 Description —A clear colourless liquid with a characteristic

Solubility — Miscible in all proportions with alcohol forming clear colourless solutions

3 Reaction—Shake 10 ml with 10 ml of carbon dioxide free water. The mixture abould be neutral to bromothymol blue or should not require more than 0.05 ml of N/10 NaOH or N/10 HCl to render it so vigorous

shaking being employed.

4 Weight per mi at 20°—0 800 to 0 811 g

5 Refractive Index — 13990 to 14000
6 Booking Range — Not less than 95 per cent should distil between

116° and 118°
7 Non-volatile Matter —Evaporate 20 ml to dryness on a water bath Not more than 1 mg of residue should be left

8 Aldehyde and Ketones—Mix in a stoppered cylinder 25 ml with 15 ml of water and 50 ml of hydroxylamine hydrochloride reagent allow to stand for 5 minutes and utrate with N/10 NoOH to the same green colour as shown by 50 ml of the reagent contained in a similar cylinder both being viewed down the axes of the cylinders. Not more than 10 ml of N/10 NoOH should be required.

o Fluorescent Impurities —When viewed in screened ultra violet light the sample should show no more fluorescence than that of a standard containing o 00002 mg of anhydrous quinne base (previously dired at

100°) per ml of N/10 H,SO,

10 Water —Titute 10 omf of methyfafcohof efectrometrically, with karl Fischer reagent, then add 20 g of the sample and again titrate with karl Fischer reagent until a small excess is present and a permanent iodine colour has bern established immediately bock titrate this excess electrometrically with a standard solution of water in methyl alcohol The volume of karl Fischer reagent used after the addition of the sample should be equivalent to not more than 80 mg of water

ANALAR

250-BUTYL ALCOHOL

(CH₁)₂ CH CH₂OH = 74 12

 $(CH_1)_2$ CH CH_2 CH = 74 12

Maximum Limits of Impurities

Acidity
Alkalimity
Non-volatile Matter
Non-volatile Matter
Aldchydes and Ketones (C4H,CHO)
Fluorescent Impurities

passes test

I Description.-A clear colourless liquid with a characteristic odour

o 6 per cent

- 2 Solubility.—Mix 10 ml with 100 ml of water A clear colouriess solution should be obtained
- 3 Reaction.—Shake io ml with io ml of carbon dioxide free water. The mutture should be neutral to bromothymol blue or should not require more than 0 of ml of N/10 NaOH or N/10 HCl to render it so, vigorous shaking being employed.
 - 4 Weight per ml. at 20° .- o 802 to o 805 g
 - 5 Refractive Index .-- no 1 394 to 1 396

Water

- 6 Boiling Range,-Not less than 95 per cent should distil between
- 7 Non-volatile Matter.—Evaporate 25 ml to dryness on a waterbath Not more than 0 5 mg of residue should be left
- 8 Aldehydes and Ketones —Mix 2; ml in a stoppered cylinder with 1; ml of water, 10 ml of ethyl alcohol and 50 ml of hydroxylamine hydrochloride reagent. Allow to stand for 5 minutes and titrate with N/10 NaOH to the same green colour as shown by 50 ml of the reagent and 10 ml of ethyl alcohol contained in a similar cylinder, both being viewed down the axes of the cylinders. Not more than 10 ml of N/10 NaOH should be required.
- a Fluorescent Impurities—When viewed in screened ultra violet light the sample should show no more fluorescence than that of a standard containing o-cocoz mg of anhydrous quinne base (previously dired at 100°) per ml of N/10 H₂SO,
- 10 Water.—Titute io ml of methyl alcohol, electrometrically, with Karl Fischer reagent, then add rog of the sample and again titrate with Karl Fischer reagent until a small everess is present and a permanent rodune colour has been established Immediately back titrate this everes, electrometrically, with a standard solution of water in methyl alcohol. The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 60 mgm of water.

ANALAR CADMIUM ACETATE

(CH₂ COO)₂Cd 2H₂O = 266 53

Viaximum Limits of Impurities

- 1 Description -Colourless crystals
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —The reaction of a solution of 1 g in 50 ml of carbon dioxide free water should not be less than 7 o using phenol red as indicator
- 4 Chloride Dissolve I g in 50 ml of water add I ml of dilute nutric acid and I ml of silver nutrate solution. No opalescence should be produced.
- 5 Sulphate —Dissolve 1 g in 50 ml of water add 1 ml of dilute hydrochlone acid and 1 ml of banum chlonde solution and allow to stand for 1 hour. No turbulty or precipitate should be produced
- 6 Nitrate—Dissolve r g in 10 ml of water add r ml of standard indigo solution and 10 ml of sulphune acid and heat to holling. The blue colour should not entirely disappear.
- 7 Iron —Dissolve 1 g in 10 ml of water and add 1 ml of dilute hydrochloric acid and 1 drop of N/10 kMinO₄ mix add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acciate shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than the produced by treating 1 ml of standard iron solution (1 ml 0.01 mg Fc) in the same manner.
- 8 Alkalıs and other Metals —Dissolve 2 g in 100 ml of water and ro ml of didute sulphume acud and electrolyse the solution for 30 minutes with a current of 3 to 4 amperes using a copper plated platinum electrode as described in appendix 5. Remove the cadmium from the cathode with mitric acid and replate it with copper make the solution just alkaline with dilute aimmonia solution add I ml of dilute sulphuric acid and electrolyse for a further 15 minutes. Exaporate the solution to dryness and ignite gently. Not more than 2 mg of residue should be obtained

o Assay.—Dissolve 4 g in 150 ml of water, add 2 g of sodium sulphate (hydrated) and titrate with N/1 NaOH, with vigorous shaking, using thymolphthalein as indicator

4(CH, COO), Cd + Na, SO4 + 6NaOH ->

4CdO,SO, + 8CH, COONa+3H,O

1 ml N/1 NaOH = 0 1777 g (CH₂ COO)₂Cd 2H₂O

Not less than 99 per cent should be indicated

ANALAR CADMIUM CHLORIDE

 $CdCl_2 2\frac{1}{2}H_1O = 228 36$

Maximum Limits of Impurities

maximum Linus of Imp	burnne	>		
Reaction	pH no	of not less than 3 g		
Sulphate (SO ₄)		01	per	cent
Nitrate (NOs)	0	002	per	cent
Iron (Fe)	0	001	per	cent
Copper (Cu)	0	001	per	cent
Lead (Pb)	0	OΣ	per	cent
Zinc (Zn)	۰	01	per	cent
Alkalis and other Metals (as sulphates) 0	١.	per	cent
Ammonia		no reaction		
Arsenic (As ₂ O ₂)		o ocor per cent		
	(r par			

- 1 Description.-Colourless crystals
- . 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Reaction The reaction of a solution of 1 g in 20 ml of carbon doxide-free water should be not less than pH 3 9, using bromophenol blue as indicator
- 4 Sulphate.—Dissolve I g in 50 ml of water, add I ml of dilute hydrochloric acid and I ml of barum chloride solution and allow to
- 5 Nitrate.—Dissolve 1 g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.

stand for a hour. No turbidity or precipitate should be produced

6 Iron.—Dissolve 1 g m ro ml of water and add 1 ml of dilute hydrochloric acid and 1 drop of N/10 KMnO₁, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 o i mg Fe) in the same manner

CADMIUM CHLORIDE-continued

- 7 Copper.—Dissolve r g m 10 ml of water, add 2 g of ettre acid, dilute ammonia solution until alkaline (about 8 ml) and r ml of a or per cent aqueous solution of sodium dethyldithocarbamate and shake with three successive portions, 5 ml, 3 ml and z ml of earbon tetra chlonde. Dry the combined carbon tetrachlonde extracts with a little anhydrous sodium sulphate. Any yellow colour produced should not be greater than that obtained by treating r ml of standard copper solution (t ml = 00 m g Cu) in the same manner.
- 8 Lead.—Dissolve 1 g in 15 ml of water, add 5 drops of glacial acetic acid and 2 ml of potassium chromate solution No turbidity or precipitate should be produced
- 9 Zinc —Dasolve 1 g in 50 ml of water, add 10 ml of sodium hydroxide solution and heat to boiling. Filter through a ho 4 xi Whatman paper and make the filtrate neutral to limins paper with dilute sulphure acid. Το 30 ml add 1 drop of ammonium thiocyanate solution, 1 drop of dilute sulphure acid and 1 ml of 2 0 05 per cent alcohole solution of β-dimethylamino-styryl β-naphthaszole methyl sodide. The solution of pd-dimethylamino-styryl β-naphthaszole methyl sodide. The solution should show no pink colour when compared with a solution containing 30 ml of water, 1 drop of ammonium thiocyanate solution, 1 drop of dilute sulphure acid and 1 ml of the resgent solution.
- to Alkalis and other Metals—Nosten 2 g of the powdered sample with 3 ml of sulphume and and heat until times of sulphume and acease to be evolved, add 1 ml of sulphume and and heat sgan to fimming Cool dissolven into om lof water and to ml of dilute sulphume and and electrolyse this solution for 30 minutes with a current of 3 to 4 miprerse, using a copper plated platinum cathode as described in appenda 5. Remove the cadroium from the cathode with nitric and and replate with copper. Make the solution just alkaline with dilute ammonia solution, add 1 ml of dilute sulphume and and electrolyse for a further 15 minutes. Everporate the solution to drivens and ignite gently. Not more
- 11 Ammonia.—Boil 2 g with 10 ml of water 2nd 5 ml of sodium hydroxide solution. No odour of ammonia should be perceptible
- 12 Arsenic—Dissolve 5 g in 20 ml of 20 per cent hydrochloric acid, add 3 drops of stannous chloride solution and distul 15 ml. To the distillate add 45 ml of water and 3 drops of stannous chloride solution and test as des
- 13 Assay.—Dissolve 0.3 g in 100 ml of water and titrate with N/10 AgNO, using potassium chromate as indicator

1 ml N/10 AgNO, = 0 01142 g CdCl2 2H2O

Not less than 99 per cent should be indicated

than 2 mg of residue should be obtained

AnalaR CADMIUM IODIDE

 $Cdl_2 = 366 25$

Maximum Limits of Impurities

 Reaction
 pi not less than 5 5

 Indate (IO₂)
 0 0006 per cent

 Sulphate (SO₄)
 0 01

 Iron (Fe)
 0 00

 Alkals and other Victals (as sulphates)
 0 2

 per cent
 0 2

- 1 Description —Pearly white flakes or a crystalline powder
- 2 Solubility —Dissolve 1 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —The reaction of a solution of 1 g in 50 ml of carbon dioxide free water should not be less than \$11 5 5 using methyl red as indicator
- 4 Iodate Dissolve 1 g in 20 ml of water 2nd add 1 g of citric acid and 1 ml of starch solution. No blue colour should be produced
- 5 Sulphate Dissolve 1 g in 50 ml of water add 1 ml of dilute hydrochlorie acid and 1 ml of barrum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 6 Iron Viosten 1 g of the powdered sample with 3 ml of sulphune acid and heat until furnes of sulphune acid cease to be evolved Dissolve the residue in 1 ml of dilute hydrochloric acid and 2 ml of water. Dilute to 10 ml with water and add 1 drop of N/10 KMnO₂ mix add 5 ml of ammonium thiocyanate solution and 10 ml of 3 mixture of equal volumes of amyl alcohol and anyl acetate shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 or ing Eq) in the same manner.
- 7 Alkalıs and other Metals—Mosten 2 g of the powdered sample with 3 ml of sulphune acid and heat until fomes of sulphune acid case to be evolved add r ml of sulphune acid and heat again to fuming Cool dissolve in roo ml of water and ro ml of didute sulphune acid and electolyse the solution for 30 minutes with a current of 3 to 4 amperes using a copper plated platinum cisthode as described in appendix 5. Remove the cadmum from the cathode with nitrice acid and replate it with copper Make the solution just alkaline with didute ammonia solution add i ml of didute sulphune acid and electrolyse for a further 15 minutes. Evaporate the solution to dryness and ignite gently. Not more that 2 mg of residue should be obtained.

(Contirued overleaf)

CADMIUM IODIDE-continued

8 Assay.—Dissolve o 8 g in 50 ml of water, add 50 ml of N/10 AgNO₃ and 5 ml of chlute nitric acid and titrate the excess of silver with N/10 NH₂SCN using ferric ammonium sulphate as indicator

Not less than 99 per eent should be indicated

. ANALAR CADMIUM SUIPHATE

3CdSO, 8H2O - 769 56

Maximum Limits of Impurities

Reaction	pH not less than 6 o
Chloride (Cl)	o ooos per eent
Nitrate (NO ₂)	G 002 per eent
Iron (Fe)	o oos per cent
Copper (Cu)	0 oor per eent
Lead (Pb)	cor per cent
Zine (Zn)	oos per eent
Alkalis and other Metals (as sulphates) or percent
Ammonia	no reaction
Arsenic (As ₂ O ₂)	o cocca per cent

(o 2 Part per million)

- I Description Colourless cristals or a erystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—The reaction of a solution of 1 g in 50 ml of carbon dioxide-free water should be not less than pH 60, using bromocresol purple as indicator
- 4 Chloride —Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 5-9 Tests for Nitrate, Iron, Copper, Lead, and Zinc are carned out as described for cadmium chloride
- 10 Alkalis and other Metals—Dasolie 2 g in 100 ml of water and 10 ml of dilute sulphuric acid and electrolyse the solution for 30 minutes with a current of 3 to 4 amperes using a copper-plated platinum cathode, as described in appendix 5. Remove the cadmium from the eathode with intine and and replate it with copper. Make the solution just alkaline with dilute ammonia solution add 1 ml of dilute sulphuric acid and electrolyse for a further 15 minutes. Evaporate the solution to dryness and ignite gently. Not more than 2 mg of residue should be obtained.

- 11 Ammonia.—Boil 2 g with 10 ml of water and 5 ml of sodium hydroxide solution. No odour of ammonia should be perceptible
- 12 Arsenic —Dissolve 10 g in 25 ml of 20 per cent hydrochloric acid, add 3 drops of stannous chloride solution and distil 15 ml. To the distillate add a few drops of bromine solution, remove the excess of bromine by a few drops of stannous chloride solution, add 45 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0 002 mg standard stain.
- 13 Assay.—Dissolve 3 g in 150 ml of water and titrate with N/1 NaOH, with vigorous shaking, using thymolphthalein as indicator

$$4\text{CdSO}_4 + 6\text{NaOH} \rightarrow 4\text{CdO}, \text{SO}_3 + 3\text{Na}_2\text{SO}_4 + 3\text{H}_2\text{O}$$

1 ml N/1 NaOH \equiv 0 1710 g 3CdSO₄8H₂O

Not less than 99 per cent should be indicated

ANALAR CÆSIUM CHLORIDE

CsCl = 168 37

Sulphate (SO ₄)	oois per cen
Nitrate (NO ₂)	o oo4 per cen
Heavy Metals (Pb)	o ooi per cen
Iron (Fe)	o coos per cen
Aluminium (Al)	ooi per cent
Calcium (Ca)	aoi per cen
Magnesium (Mg)	o o25 per cen
Ammonia (NH ₂)	o coz per cen
Sodium	no reaction

- I Description.—White deliquescent crystals
- 2 Solubility.—(a) Dissolve 0 5 g in 10 ml of water The solution should be clear, colourless and neutral to litmus paper
- (b) Dissolve 0.5 g in 50 ml of 95 per cent alcohol. The solution should be clear and colourless and free from insoluble matter
- 3 Sulphate—Dissolve 0.5 g in 25 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbulity or precipitate should be produced
- 4 Nitrate—Dissolve o 5 g in io ml of water, add i ml of standard indigo solution and io ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Heavy Metals and Iron —Dissolve o 5 g in 10 ml of water, add 1 ml of dilute ammona solution and press hydrogen sulphide through the solution for a few seconds Am colour produced should not he deeper than the "standard colours" defined in appendix 2

CÆSIUM CHLORIDE-continued

011---1-(01)

- 6 Aluminium.—Dissolve 0.5 g in 15 ml of water, add 1 g of ammonium acetate, 5 ml of dilute acetic acid and 1 ml of a 0.7 per cent aqueous solution of ammonium aumontracibrolystate ("aluminon") Allow to stand for 5 minutes and then add 10 ml of ammonium carbonate solution. Any pink colour produced should not be greater than that produced by treating 0.5 ml of standard aluminium solution (1 ml = 0.0 mg Al) in the same manner.
- 7 Calcium Dissolve o 5 g in 10 ml of water, add 1 ml of dulute ammonia solution and 1 ml of ammonium oxalate solution and allow to stand for 2 hours. No turbudity or precipitate should be produced.
- 8 Magnessum —Dissolve 0.5 g in 10 ml of water, add 5 ml of dilute ammonia solution and 5 ml of ammonium phosphate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced
- 9 Ammonia Dissolve 0 5 g in 50 ml of water and add 2 ml of Nessler's reagent. Any colour produced should not exceed that given by the addition of 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 0 mg NH₂)
- to Sodium—Heat a little of the salt on a platinum wire in the Bunsen flame. The flame should be troted the lilac-red colour characteristic of custum and should show none of the bright yellow colour of the sodium flame.
- 11 Assay.—Dissolve 0.5 g of the fused sample in 100 ml of water, acidify with 5 ml of dilute nitro acid and add silver nitrate solution alovely with stirring until present in slight excess (about 15 ml is required). Heat to boiling allow to cool in the dark, filter through asbestos in a Gooch crueible wash first with water containing a little nitro acid, then with water, dry at 130° and weigh the AgCl

Weight of AgCl × 1 1746 = weight of CsCl

Not less than 99 9 per cent and not more than 100 1 per cent should be indicated

ANALAR

CALCIUM CARBONATE

CaCO, == 100 09

Maximum Limits of Impurities

0.007 MOT COD!

Chioride (Ci)	o oor per cent
Sulphate (SO ₄)	o or per cent
Phosphate (PO.)	o ooz per cent
Silicate (SiO ₂)	o or per cent
Heavy Metals (Pb)	o oo2 per cent
Iron (Fe)	o oo i per cent
Ammonia	no reaction
Magnesium (Mg)	o o2 per cent
Alkalıs (Na)	o o3 per cent

- 1 Description -A white powder
- 2 Solubility —Insoluble in water Free grams is soluble with efferves cence in 25 ml of water and 25 ml of dilute hydrochlone acid form ng a clear colourless solution
- 3 Chloride—Dissolve I g in 45 ml of water and 5 ml of dilute nitric acid and add I ml of silver nitrate solution. No opalescence should be produced.
- 4 Sulphate—Dissolve I g in 45 ml of water and 5 ml of dilute hydrochloric acid, add I ml of banum chloride solution and allow to stand for 6 hours No turbudity or precipitate should be produced
- 5 Phosphate Dissolve τ g in 6 ml of dilute hydrochloric and and dilute to μ 0 ml. To 20 ml (textain the remainder for Test No. 6) add 2 ml of dilute hydrichloric and τ ml of phosphate reagent No. τ and τ munutes. Any blue colour produced should not be deeper than that given by a mixture containing τ ml of standard phosphate solution (τ ml = 0 to τ produced τ of τ or τ of τ of τ or τ or τ of τ of τ or τ or τ of τ of τ or τ or τ or τ or τ or τ or τ of τ or τ
- 6 Silicate—To 2 ml of the solution retained from Test No 5 add 20 ml of water, 1 ml of dilute hydrochloric acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes Any blue colour produced should not be deeper than that given by 1 ml of standard phosphate solution (1 ml = 001 mg PO₄) treated simularly
- 7 Heavy Metals and Iron—Dissolve 1 g in 40 ml of water and 5 ml of dilute hydrochloric acid Boil to expel carbon dioxide cool, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2.
- 8 Ammonia.—Warm 1 g with 10 ml of sodium hydroxide solution. No odour of ammonia should be perceptible
- 9 Magnesium Dissolve I g m 5 ml of dilute hydrochloric acid and 25 ml of stater, add 5 ml of dilute ammonia solution and 5 ml of dilute acetic acid, heat to boiling add 22 ml of ammonium molybdate solution (10 per cent) in small quantities at a time and boil gently for 13 minutes. Tool, adjust view volume to 50 ml and 18 me. "Vo 5 ml of the filtrate add 20 ml of water and 0 5 ml of a 0 1 per cent aqueous solution of titan yellow and 10 ml. of sodium hydroxide solution. Any pink colour produced should not exceed that given by 0 2 ml of standard magnesium solution (1 ml = 0 1 mg Mg) in 25 ml of water when treated with 0 5 ml of titan yellow solution and 10 ml of sodium hydroxide solution.
- ro Alkalis —Dissolve 5 g m 25 ml of dilute nitric acid and add to ml. of dilute ammonia solution and 25 ml of ammonium carbonate solution. Warm for a few minutes filter, and wash the precipitate with water. Evaporate the filtrate and washings to dryness and ignite the Continual or cultoff.

CALCIUM CARRONATE-continued

residue gently to remove ammonium salts. Dissolve the residue in 10 ml of water and 1 ml of dilute intra acid add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution, allow to stand for 1 hour and filter. Evaporate the filtrate to dryness to the residue add 2 drops of sulpliuric acid and ignite. Not more than 5 mg of residue should be obtained.

11 Assay —Dissolve 2 g in 50 ml of N/1 HCl and 50 ml of water and titrate the excess of acid with N/1 NaOH using bromophenol blue is indicator

1 ml N/1 HCl = 0 05005 g CaCO,

Not less than 99 per cent should be indicated

ANALAR CALCIUM CHLORIDE (DRIED)

C2Cla + aq

Maximum Limits of Impurities

Reaction	pH not greater than 8 5
Sulphate (SO ₄)	oor per cent
Nitrate (NO ₃)	0 004 per cent
Phosphate (PO ₄)	ooz per cent
Silicate (SiO ₃)	0 004 per cent
Heavy Metals (Pb)	0 002 per cent
Iron (Fe)	o oor per cent
Barium and Strontium (Ba + Sr) 002 percent
Alkalıs (Na)	0 o6 per cent
Arsenic (As ₂ O ₂)	o occa per cent
	(2 parts per million)

- 1 Description Opaque deliquescent white masses
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —The reaction of a solution of 2 g in 50 ml of carbon dioxide free water should not be more alkaline than ρH 8 5 using thymol blue as indicator
- 4 II Other Tests —These should be carried out as described under Calcium Chloride (Hydrated) Tests Nos 4 to 11 using in each test one half the specified amount of the sample
- 12 Assay —Dissolve 0.2 g m 50 ml of water and titrate with N/10 AgNO, using potassium chromate as indicator

1 ml N/10 AgNO3 = 0 005549 g CaCl2

Not less than 70 per cent and not more than 75 per cent should be indi-

ANALAR

CALCIUM CHLORIDE (HYDRATED)

$CaCl_2 6H_2O = 219 09$

Reaction	pit 6 5 to 1	7.5
Sulphate (SO ₄)	0 005 pe	r cent
Nitrate (NO ₂)	0 002 pe	r cent
Phosphate (PO ₄)	0 001 pe	r cent
Silicate (SiO ₂)	0 005 pc	cent
Heavy Metals (Pb)	0 001 pe	r cent
Iron (Fe)	0 0005 pe	
Barrum and Strontium (Ba + Sr)		cent
Alkalıs (Na)		r cent
Arsenic (As ₂ O ₃)	o coof pe	
	(1 part per m	

- t Description -Deliquescent colourless crystals
- a Solubility.—Dissolve 5 g in 50 ml of water, a clear colourless solution should be produced. One gram forms a clear solution in 6 ml of 90 per cent ethyl alcohol
- 3 Reaction.—The reaction of a solution of 3 g in 50 ml of carbon dioxide free water should lie between the limits of pH 6 5 and 7 5, using bromothymol blue and phenol red as indicators
- 4 Sulphate.—Dissolve 2 g in 50 ml of water, add 1 ml of dilute horizonta and and 1 ml of barum chloride solution and allow to stand for 6 hours. No turbelity or precipitate should be produced
- 5 Nitrate Dissolve 2 g in 10 ml of water, add 10 ml of dilute suiphure acid, allow to stand for 5 minutes with occasional surring and filter. To 10 ml of the filtrate add 1 ml of standard indigo solution and 10 ml of sulphure acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Phosphate —Dissolve 2 g in 40 ml of water To 20 ml (retain the remainder for Test No 7) add 3 ml of diute hydrochloric acid, i ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than that given by 1 ml of standard phosphate solution (1 ml = 0 or mg PO₂) treated in a similar manner
- 7 Sulicate.—To 2 ml of the solution retained from Test No 6 add 20 ml of water, 1 ml of dilute hydrochloric acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a waterbath at 60° for 10 minutes. Any blue colour produced should not be deeper than that given by 1 ml of standard phosphate solution (1 ml = 000 mg PO) treated similarly.
- 8 Heavy Metals and Iron—Dissolve 2 g in 45 ml of carbon dioxide-free water, add 5 ml of dilute ammonia solution and pass hydrogen

CALCIUM CHLORIDE (HYDRATED)-contin ed

sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours? defined in appendix 2

o Barium and Strontium —Dissolve r g in 10 ml of water add 10 ml of calcium sulphate solution and allow to stand for 6 hours

No turbidity or precipitate should be produced

- 10 Alkalis —Dissolve 5 g in 100 ml of water and add to ml of dilute ammonia solution and 25 ml of ammonium carbonate solution. Warm for a few minutes filter, and wash the precipitate with water Evaporate the filtrate and washings to dryness and ignite the residue gently to remove ammonium salts. Dissolts the residue in 10 ml of water and 1 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution allow to stand for 1 hour and filter Evaporate the filtrate to dryness to the residue add 2 drops of sulphuric acid and ignite. Not more than c mg of residue should be obtained
- 11 Arsenic—Dissolve 5 g in 50 ml of water add 10 ml of stannated hydroelloric acid and test as described in appendix 4. Any stan produced should not be greater than a 000 mg standard stain

ANALAR

CALCIUM SULPHATE (HYDRATED)

CaSO, 2H,O = 17" 18

Maximum Limits of Impurities

Carbonate (CO ₂)	o i per cent	
Chloride (CI)	o oog per cent	
Nitrate (NO ₂)	0 004 per cent	
Iron (Fe)	o oor per eent	
Alkal s (Na)	o 03 per cent	
Arsenie (As ₁ O ₃)	o oopo4 per cent	
	(o 4 parts per mill on)	

Loss on ign tion 20 5 to 21 5 per cent

1 Description -A white powder

Sankanasa (CO)

- 2 Solublity—Slightly soluble in hot or cold water Dissolve i g in 50 ml of warm dilute hydrochloric acid A clear colourless solution should be obtained
- 3 Carbonate —Bo l r g with 50 ml of water cool and titrate with N/10 HCl using bromophenol blue as indicator. Not more than 0.3 ml should be required
- 4 Chloride—Boil 3 g with 50 ml of water and 1 ml of fute nitric acid and filter hot to the cooled filtrate add 1 ml of silver n trate solution Any opalescence produced should not be greater than the standard opalescence defined in appendix 2
- 5 Nitrate—Mix 0.5 g with 10 ml of water add 1 ml of standard indigo solution and 10 ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.

- 6 Iron —Boil 2 g with 2 ml of ddute hydrochloric acid and 6 ml of water and filter hot, treat 4 ml of the filtrate with 1 drop of N/10 KMnO₄, mix, add 5 ml of ammonium theocyanate solution and 10 ml of a mix ture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper laper should not exceed that produced by treating 1 ml of standard iron solution (1 ml = 0.01 mg Fe) in the same manner.
- 7 Alkalis —Boil 2 g with 6 ml of hydrochloric acid and 100 ml of water, add a slight excess of dulute ammonia solution followed by 2 5 g of ammonium oxalate and digest on the water hath for one hour, filter, evaporate the filtrate to dryness and ignite gently to remove ammonium salts. Dissolve the residue in 10 ml of water and 1 ml of dulute nitric acid, add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution, allow to stand for 1 hour and filter. Evaporate the filtrate to dryness and ignite. Not more than 2 mg of residue should be obtained
- B Arsenic.—Treat 5 g with 10 ml of stannated hydrochlone acid and 50 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0 ooz mg standard stain
- g Loss on Ignition—Heat I g to dull redness. The loss in weight should be not less than 205 mg, and not more than 215 mg.

ANALAR CARBON DISULPHIDE

 $CS_2 = 7614$

Maximum Limits of Impurities

Acidity (SO₂) Non volatile Matter Hydrogen Sulphide o cor per cent o cor per cent passes test

- r Description —A clear, almost colourless liquid with a characteristic odour
- 2 Solubility.—Insoluble in water Miscible with absolute alcohol and with ether forming clear colourless solutions
- 3 Acidity.—Add 25 ml to a muxture of 10 ml of carbon dioxide-free water, o 2 ml of phenolphthalem solution and o 1 ml of N/10 NaOH and shake vigorously. The pank tokout should not enturely disappear
 - 4 Weight per ml. at 20° .- 1 261 to 1 266 g
 - 5 Refractive Index -- n² 1 6275 to 1 6283
 6 Boiling Range -- Not less than 95 per cent should distil between
- 46° and 47°

 7 Non-volatile Matter,—Evaporate 25 ml to dryness on a water-
- bath Not more than img of residue should be left
- 8 Hydrogen Sulphide —Shake 20 ml with 10 ml of water and 1 ml of lead acetate solution No darkening should be produced.

ANALAR CARBON TETRACHLORIDE

CCI, = 151 84

Maximum Limits of Impurities

- Description —A clear colourless liquid with a characteristic odour
 Solubility —Almost insoluble in water. Miscal le with alcohol con-
- 2 Solubility —Almost insoluble in water Miscil le with alcohol and with ether forming clear colourless solutions
 - 3 Weight per ml at 20° -- 1 592 to 1 595 g
- 4 Refractive Index n.º 14595 to 14010 5 Bolling Range — Not less than 95 per cent should distil between 76° and 27°
- 6 Non volatile Matter Evaporate 20 ml to dryness on a water bath Not more than 0 5 mg of residue should be left
- 7 Acidity and Ionised Chloride—Shake 10 ml with 10 ml of water for 1 minute. The aqueous layer should be neutral to litmus paper and on the addition of 1 ml of silver nitrate solution no opalescence should be produced.
- 8 Free Chlorine—Shake 10 ml with z ml of cadmium iodide solution and 3 ml of starch solution for 1 minute No blue colour should be produced
- 9 Oxygen Absorption Shake 10 ml with a cooled m xture of 10 ml of sulphure end and 10 ml of N/10 h.Cr₂O₂ for 10 minutes dilute with 50 ml of water cool add 1 ml of potassium rodide solution and titrate the liberated rodine with N/10 Na₂S O₃ Not less than 9 5 ml of N/10 Na₂SO₃ should be required
- 10 Carbon Disulphide—Boil to ml with 1 ml of absolute alcohol and 3 ml of potassium plumbite solution for 15 minutes under a reflux condenser and allow to stand for 3 minutes. No darkening should be produced in the aqueous layer.
- 11 Water Titute 20 ml of methyl alcohol electrometically with harl l'ischer reagent then add 20 g of the sample and again titute with harl l'ischer reagent until a small excess is present and a permanent iodine colour has been established. Immediately back utrate this excess electro metrically with a standard solution of water in methyl alcohol. The folume of Karl l'ischer reagent used after the addition of the sample should be equivalent to not more than 4 mg of water.

ANALAR

CERIC AMMONIUM NITRATE

 $Ce(NO_3)_4 2NH_4NO_3 = 548.26$

Maximum Limits of Impurities

Chloride (Cl)	o oor per cent
Sulphate (SO ₄)	o oos per cent
Iron (Fe)	o oo2 per cent
Alkalis and other Vietals (as sulphates)	o os per cent

1 Description.—An orange-yellow crystalline powder

- 2 Solubility.—Dissolve 5 g in 25 ml of water and 25 ml of dilute sulphure acid. A clear solution should be produced which is orangeyellow when cold and orange-red when hot
- 3 Chloride.—Dissolve I g in 50 ml of water, add I ml of dilute ruttre acid and I ml of silver nitrate solution. No opalescence should be produced.
- 4 Sulphate.—Dissolve 1 g in 10 ml of water, add 1 g of hydroxlamme hydrochloride and, when the initial reaction has subsided, boil until clear Cool, dilute to 50 ml with water, add 1 ml of hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 5 Iron.—Dissolve 0.5 g in 5 ml of water and 5 ml of dilute hydrochoric scale, boil for 1 mnute, cool and add 1 drop of N/10 KMnO_L mux, add 5 ml of ammonium those wate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl actiate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml \approx 0.0 mg Fe) in the same manner
- 6 Alkalis and other Metals.—Dissolve 5 g in 100 ml of water, add 15 ml of dilute ammonia solution and boil. Filter and wash well with hot water, evaporate the filtrate to dryness, mosten the residue with a few drops of sulphurie acid, ignite and weigh. Not more than 2 5 mg should be obtained.
- 7 Assay.—Dissolve 2 g in 50 ml of water, add 10 ml of sulphuric acid and titrate with N/10 FeSO₄ (NH₄).5O₄ using o-phenanthroline-ferrous complex as indicator
 - 1 ml N/10 FeSO₄ (NH₄)₂SO₄ \equiv 0 05483 g Ce(NO₃)₄ 2NH₄NO₃

Not less than 97 per cent, and not more than 102 per cent should be indicated

ANALAR CHLOROACETIC ACID

CH,Cl COOH = os so

Maximum Limits of Impurities

Sulphated Ash	oos percent
Chloride (Cl)	o ooog per cent
Sulphate (SO ₄)	o oos per cent
Nitrate, (NO ₂)	0 002 per cent
Heavy Metals (Pb)	0 0004 per cent
Iron (Fe)	o oooz per cent

- Description Colourless crystals
- 2 Solubility—Readily soluble in alcohol Dissolve 5 g in 50 ml of water a clear colourless solution should be produced
- 3 Freezing Point—Not below 61° determined by melting m a test tube and seeding with a crystal of the original material
- 4 Sulphated Ash Moisten 2 g with sulphune acid and ignite gently
- Not more than 1 mg of residue should be left

 5 Chloride—Dissolve 2 g in 50 ml of water and add 1 ml of
 dilute nitro and and 1 ml of silver nitrate solution. No onalescence
- should be produced

 6 Sulphate—Dissolve 2 g in 50 ml of water and add 1 ml of dilute hydrochloric acid and 1 ml of barnum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 7 Nitrate—Dissolve I g in 10 ml of water add I ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear
- 8 Heavy Metals and Iron—Dissolve 5 g in 35 ml of water add 15 ml of dilute unniona solution and pass by drogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 9 Assay —Dissolve 3 g in 50 ml of water and titrate with N/t NaOH using phenolphthalein as indicator

r ml N/r NaOH = o og450 g CH2Cl COOH

Not less than 99 per cent should be indicated

ANALAR

I-CHLORO-2.4-DINITROBENZENE

 $(NO_2)_2C_4H_3Cl = 202.46$

Maximum Limit of Impurity

Sulphated Ash

o oz per cent

o oor per cent

- 1 Description —I ellow crystals
- 2 Solubility —Insoluble in water Soluble in other Dissolve 2 g in 50 ml of 90 per cent alcohol A clear yellow solution should be produced
 - 3 Melting Point -50° to 52°

Non volatile Matter

4 Sulphated Ash—Ignite 5 g very gently until most of the material has volatilised allow to cool moisten with sulphuric acid and gently re ignite. Not more than 1 mg of residue should be left

ANALAR CHLOROFORM

CHCl, = 119 39

Maximum Limits of Impurities

Acidity . no reaction Chloride no reaction Free Chlorine no reaction Ammonia no reaction Aldehyde no reaction Phosgene Decomposit on Products dortoses on passes test Foreign Organic Matter Water o os per cent

- I Description —A clear colourless liquid with a characteristic odour Contains about 2 per cent v/v of alcohol as a preservative
- 2 Solubility —Slightly soluble in water Miscible in all proportions with alcohol and with other
 - 3 Weight per ml at 20° -1 474 to 1 479 g
 - 4. Refractive Index -n20 1 4435 to 1 4445
- 5 Borling Range —Not less than 95 per cent should distil between 60° and 62°
- 6 Non volatile Matter—Evaporate 50 g to dryness on a water bath Not more than 0 5 mg of residue should be lest

(Continued overleaf)

CHLOROFORM!-continued

- 7 Addity—Shake 10 ml with 25 ml of carbon dioxide free water and allow to separate To 5 ml of the aqueous layer add 0 x ml. of neutral littinus solution the colour produced should not differ from that of 5 ml of carbon dioxide free water to which 0 x ml of neutral littinus solution has been added
- 8 Chloride —To 5 ml of the aqueous solution produced in Test No 7, add o r ml of silver nitrate solution No opalescenee should be produced
- 9 Free Chlorine—To c ml of the aqueous solution produced in Test No 7 add r ml of cadmium iondie solution and r ml of starch solution. No blue colour should be produced
- to Ammonia and Aldehyde—To 10 ml of the aqueous solution produced in Test No 7 add 0.5 ml of Acssler's reagent. No yellow colour should be produced
- 11 Phosgene Decomposition Products—Mix 15 ml with 0 oz g of vanilin and 0 oz g of resortenol and allow to stand in the dark for 1 hour. The solution should remain perfectly clear and colourless and, on shaking with 1 ml of dilute ammonis solution and 4 ml of water and allowing to separate the aqueous layer should not show any immediate pank colour.
- 12 Foreign Organic Matter—Shake 20 ml with 10 ml of sulphuric acid for 5 minutes and allon to stand in the dark for 30 minutes Both layers should remain colourless. Separate the two layers and dilute 2 ml of the acid layer with 5 ml of water no unpleasant odour should be produced and on the addition of 10 ml of water and 1 ml of silver nitrate solution no opalescence should be produced.

Shake 15 ml of the separated chloroform layer from the above test with 30 ml of water for 3 minutes separate the aqueous layer and add to it 1 ml of silver nitrate solution. No opalescence should be produced.

Shake 25 ml with 15 ml of sulphuric acid and 0.2 ml of formaldehyde solution and allow to stand in the dark for 1 hour. The acid layer should not be more than faintly coloured.

13 Water—Titrate 20 ml of methyl alcohol electrometricelly with Karl Fischer reagent then add 20 ml of the sample and again titrate with Karl Fischer reagent until a small excess is present and a permanent iodine colour has heen eartblished. Immediately back titrate this excess, electrometricelly with a standard solution of water in methyl alcohol. The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than to mg of water.

ANALAR CHROMIUM CHLORIDE

CrCl₂ 6H₂O = 266 48

Maximum Limits of Impurities

Sulphate (SO₄) oo sper cent
Iron (Fe) oo sper cent
Aluminium (Al) oo sper cent,
Ammonia
Alkalis and other Metals (as sulphates)
o 3 per cent
o 2 per cent

- Description,-Dark green deliquescent crystals
- 2 Solubility.—Dissolve 1 g in 50 ml of water A clear dark green solution should be obtained
- 3 Sulphate.—Dissolve I g in 50 ml of water, add I ml of dilute hydrochloric acid and I ml of barium chloride solution and allow to stand for I hour No turbidity or precipitate should be produced
- 4 Iron.—Dissolve 0 2 g m to ml of water, add t ml of dilute hydrochlore acid and t drop of N/10 KMnO4, mx, add 5 ml of ammonium thio-cyanate solution and to ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Amy colour produced in the upper layer should not be greater than that pinduced by treating 2 ml of standard iron solution (1 ml = 0 of mg. Fe) in the same manner.
- 5. Aluminium —Dissolve 2 g, in 50 ml of cold water, add 3 g of sodium peroude in small portions and boil, filter and wash with water Acidity the filtrate with hydrochloric acid, add a slight excess of dilute ammonia solution, boil off the excess of ammonia, filter, wash with hot water and ignite and weigh the residue Not more than 2 mg should be obtained
- 6 Ammonia.-Dissolve 1 g in to ml of water, add 5 ml of sodium hydroxide solution and boil No odour of ammonia should be perceptible
- 7 Alkalis and other Metals.—Dissolve 2 g in 50 ml of water, add 10 ml of dilute animonia solution, boil gently for 2 minutes and filter Evaporate 30 ml of the filtrate to dryness, moisten with sulphuric acid, ignite gently and weigh the residue. Not more than 3 mg should be obtained.
- 8 Assay.—Dissolve 0 3 g in 100 ml of water, add 5 ml of sodium hydroxide solution and 2 5 g of sodium peroxide in small portions. Boil for 10 minutes, cool, add 40 ml of dilute sulphuric and and 3 g

(Continued overleaf)

CHROMIUM CHLORIDE-cortimed

of potassium iodide and titrate the liberated iodine with N/10 Na₂S₂O₃, using starch solution as indicator

1 ml N/10 Na2S2O4 = 0 008883 g CrCl, 6H,O

Not less than 95 per cent and not more than 102 per cent should be

ANALAR

CHROMIUM POTASSIUM SULPHATE (Chrome Alum)

CrK(SO₄), 12H₂O = 499 43

Chloride (CI)	o ooi per cent
Chromete (CrO ₄)	org per cent
Iron (Fe)	0 02 per cent
Aluminium (Al)	o og per cent
Ammonia	no reaction

- 1 Description.-Violet crystals or crystalline powder
- 2 Solubility.—Dissolve 1 g in 50 ml of water A clear violet-blue solution should be produced
- 3 Chloride.—Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 4 Chromate.—Dissolve i g in 20 ml of water, add 5 ml of dilute ammonia solution, heat to boiling and filter. The filtrate should be colourless.
- 5 Iron —Dissolve o 1 g m 10 ml of water and add 1 ml of dulute hydrochlone acid and 1 drop of N/10 KNInQ, mm, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake suporously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 2 ml of standard iron solution (1 ml = 0.01 mg Fe) in the same manner
- 6 Aluminium —Dissolve 5 g in 50 ml of cold water, add 3 g of sodium percende in small portions and boal, filter and wash with water Acidify the filtrate with hydrochlone acid, add a slight excess of distance and it is a summan solution, boil off the excess of ammona, filter, wash with hot water and ignite and weigh the residue. Not more than 5 mg should be obtained
- 7 Ammonia.—Dissolve 1 g in 20 ml of water, add 5 ml. of sodium hydroxide solution and boil No odour of ammonia should be perceptible

8 Assay —Dissolve o 5 g in 100 ml of water add 5 ml of sodium hydroxide solution and 2.5 g of sodium peroxide in small portions. Boil for 10 minutes cool add 40 ml of dilute sulphure acid and 3 g of potassium iodide and titrate the liberated rodine with N/10 Na₂S₂O₃ using starch solution as indicator

1 ml N/10 Na₂S₂O₃ \equiv 0.01665 g CrK(SO₄)₂ 12H₂O

Not less than 99 5 per cent and not more than 100 5 per cent. should be indicated,

ANALAR

CHROMIUM TRIOXIDE

 $CrO_a = 100 \text{ or}$

Maximum Limits of Impurities

 Sulphate (SO₄)
 0 02 per cent

 Nutrate (NO₄)
 0 004 per cent

 Iron (Fe)
 0 01 per cent

 Alumnum and Chromium Salts
 no reaction

 Alkalis (Na)
 0 1 per cent

- 1 Description —Dark red crystals or crystaline powder or almost black crystaline masses
- 2 Solubility Dissolve 5 g in 50 ml of water A clear orange coloured solution should be produced
- 3 Sulphate Dissolve T g in 50 ml of water and add 1 ml of delute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 3 hours. No turbidity or precipitate should be produced.
- 4 Nitrate—Dissolve t g m 5 ml of water add 6 ml of dilute ammonia solution heat to boiling add 3 g of britum chloride dissolved in 10 ml of water and filter. To 10 ml of the filtrate add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Iron—Dissolve o I g in 25 ml of water add 2.5 ml of dilute hydrochloric acid and pass sulphur dioxide through the solution until the chromate is completely reduced. Boil until the excess of sulphur dioxide is removed cool and adjust the volume to 25 ml. Add I ml of dilute hydrochloric acid and I drop of N/10 kMnO₄ mix add 5 rol of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate—shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating I ml of standard iron solution (I ml = 0 or mg. Fe) in the same manner.
- 6 Aluminium and Chromium Salts—Dissolve 1 g in 50 ml of water and add 5 ml of didute ammonia solution. The resulting solution should be pale yellow and free from turbudy to precipitate.

CHROMIUM TRIOXIDE-continued

- 7 Alkalis Ignite i g in a porcelain crucible fitted with a lid, extract the residue with 30 ml of hot water and filter. Evaporate the filtrate and ignite the residue with 20 ml of hot water, filter, evaporate and ignite obtained. Not more than 5 mg of residue should be obtained.
- 8 Assay.—Dissolve 1 g in sufficient water to produce 250 ml, to 25 ml of this solution add 2 g of potassium rodide and 10 ml of dilute hydrochlorie acid and titrite the liberated rodine with N/10 Na₂S₂O₃ using starch solution as indicator

1 ml N/10 Na2S2O3 = 0 003333 g C1O3

Not less than 99 per cent should be indicated

ANALAR CITRIC ACID

COOH CH, C(OH)(COOH) CH, COOH H,O = 210 14

Ash	o or per cent
Chloride (Cl)	o ooog per cent
Sulphate (SO ₄)	0 002 per cent
Oxalate (C,O,)	oor percent
Tartrate	passea test
Lead (Pb)	0 0002 per cent
Iron (Fe)	o coor per cent
Arsenic (As ₂ O ₃)	o cocci per cent
	(o t part per million)

- I Description Colourless crystals
- 2 Solubility.—Dissolve 5 g m 50 ml of water A clear colourless solution should be produced
 - 3 Ash -Ignite to g, not more than I mg of residue should be left
- 4 Chloride,—Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 5 Sulphate Dissolve 5 g in 50 ml of water and add r ml of dilute hydrochlone acid and r ml of barnun chloride solution and allow to stand for 6 hours No turbidit or precipitate should be produced
- 6 Oxalate—Discolve I g in 4 ml of water, add 2 ml of hydrochloric and and boil for 1 minute with about 1 g of granulated 2nx-Allow to stand for 2 minutes, decant into a test tube containing 0 25 ml of a 1 per cent aqueous solution of phenylhydraune hydrochloric and least to boiling Cool rapidly, add an equal volume of hydrochloric acid

and o 25 ml of a 5 per cent solution of potassium ferricyanide and shake No red colour should be produced

- 7. Tartrate.—Heat 1 g of the powdered acid with 10 ml of sulphuric acid at 100° for 10 minutes The solution may become yellow but should not become brown
- 8 Lead.—Dissolve 12 g in 40 ml of dilute ammonia solution, add 1 ml of potassium cyande solution, dilute with water to 50 ml and add 2 drops of sodium sulphide solution. Any colour produced should not be deeper than that given by the addition of 2 drops of sodium sulphide solution to 50 ml of an aqueous solution containing 2 g of the sample, to ml of dilute ammonia solution, 1 ml of potassium cyanide solution and 2 ml of standard lead solution (in ml = 000 mg Pb)
- 9 from.—Dissolve 5 g m 10 ml of water and add 1 ml of dilute bydrochloric acid and 1 dtop of N_{10} KMnO₄, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acctate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 0.5 ml of standard iron solution (1 ml = 0.01 mg Fe) in the same manner
- 10 Arsenic.—Dissolve 10 g in 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stan produced should not be greater than a 0 oo img standard stain.
- II Assay.—Dissolve 3 g in 50 ml of water and titrate with N/I NaOH using thymol blue as indicator

1 ml N/1 N2OH = 0 07005 g H3C6H1O7.H2O

Not less than 99 5 per cent should be indicated

ANALAR COBALT CHLORIDE

CoCl, 6H,O = 237 95

Maximum Limits of Impurities

 Sulphate (SO,)
 0 or per cent

 Nuckel (Nu)
 0 olz per cent

 Iron (Fe)
 0 003 per cent

 Zine (Za)
 0 005 per cent

 Alkalıs and Alkalıne Earths (Na)
 0 03 per cent

- Description.—Deep red crystals or crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear pink solution should be produced
- 3 Sulphate.—Dissolve I g in 50 ml of water, add I ml of dilute hydrochloric acid and I ml of barium chloride solution and allow to stand for I hour No turbidity or precipitate should be produced

COBALT CHLORIDE-continued

4. Nickel.—Dissolve 16 g in 100 ml of a 10 per cent w/v solution of potassium thoreganate. De-exygenate by passing a stream of hydrogen for five minutes and polarograph over the range -0.25 volts to -0.65 volts, with an applied potential of 2 bolts. Return the solution in the polarographie cell, together with the mercury, to the solution under test Add 2 ml of standard nickel solution (f ml =0 1 mg Ni), mix well, and polarograph as before. The wate height obtained in the first experiment should not be greater than the increase in beight obtained in the second experiment.

S fron —Dissolve 5 g in 50 ml of water, add 0.5 g of zine oxide and boil for 1 minute Filter and wash with water Dissolve the residue in 4 ml of dilute hydrochloric acid and 50 ml of water, add 0.5 g of zine oxide and boil for 1 minute Filter and wash with water Re dissolve the residue in 5 ml of dilute hydrochloric acid and dilute with water to 50 ml. To 10 ml add 1 ml of dilute hydrochloric acid, 1 drop of N/10 kMnO4 and 5 ml of aumonium thicopyanise solution. Any pink colour produced should not be greater than that obtained by treating 15 ml of standard iron solution (1 ml = 0 or ing Fe) in a similar manner.

6 Zinc — Dissolve 5 g in 20 ml of water, add 1 ml of dulte hydro-chloric scid and 5 ml of ammonium thooyanate solution and extract with 15 ml of ether. Evaporate the ether from the ethercal extract and to the residue add cautiously 0 g ml of intricated. When the vigorous reaction has ceased evaporate to dryness dissolve the residue in 1 drop of dultie hydrochlone acid and 4 ml of water, boil and filter. To the filtrate add potassium cyanide solution (2 to 3 ml) until the precipitate formed just redissolves. Pass a current of air through the solution for minutes add 2 ml of formaldehyde solution and 2 drops of hydrochloric acid and allow to stand for 1 hour. No turbidity or precipitate should be produced.

7 Alkalis and Alkaline Earths.—Dissolve 2 g in 50 ml of water, add 5 g of ammonium chloride and 5 ml of dilute ammonia solution and precipitate the cobalt with hydrogen sulplinde, filter, evaporate the filtrate to dryness, moisten with sulpliuric scid, ignite gently and weigh the residue Not more than 2 mg should be obtained.

8 Assay.—Dissolve 2 g in 75 ml of water, add 2 g of hydraine sulphate, 10 ml of dilute hydrochloric acid and warm until solution is com plete. Slowly add 15 ml of strong amonius solution with vigorous string, dilute to 150 ml with water, warm to 70° and electrolyse the solution at this temperature, for 1 hour with a current of 3 amperes, using a weighed platinum cathode, as desembed in appendix 5. Wash the cathode with water, then with acctione, dry and weigh

Weight of Co x 4-037 = weight of CoCl₃ 6H₂O

ANALAR

COBALT NITRATE

 $C_0(NO_3)_3 6H_2O = 291 05$

Maximum Limits of Impunities

Chloride (CI)	a aor per cent
Sulphate (SO ₄)	oos per cent
Nickel (Ni)	o or per cent
Iron (Fe)	0 003 per cent
Zinc (Zn)	0 005 per cent
Alkalis and Alkaline Earths (Na)	0 03 per cent
Ammonia	no reaction

- 1 Description Deliquescent red crystals
- 2 Solubility Dissolve 5 g in 50 ml of water $\,$ A clear pink solution should be produced
- 3 Chloride—Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric and and 1 ml of silver nitrate solution. No opalescence should be produced.
- 4 Sulphate—Dissolve 1 g in 50 ml of water add r ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 5 Nickel —Dissolve 2 g in 100 ml of a 10 per cent w/v solution of potassium thoughnate and proceed as in Test No 4 in the specification for Cobalt Chloride
- 6-8 Tests for Iron, Zinc, Alkalis and Alkaline Earths are carried out as described for Cobalt Chloride
- o Ammonia—Dissolve 1 g in 10 ml of water add 5 ml of sodium hydroxide solution and boil No odour of ammonia should be perceptible
- 10 Assay Dissolve 2 g in 10 ml of water add 10 ml of sulphune acid and evaporate almost to dryness on a sand bath. Allow to cool add 75 ml of water 2 g of hydrazme sulphate and 10 ml of dilute hydrochlone acid and warm until solution is complete. Slowly add 15 ml of strong ammonia solution with vigorous sturing dilute to 150 ml with water warm to 70° and electrolyse the solution exactly as described for Cobalt Chloride.

Weight of Co $\times 4.938 =$ weight of Co(NO₃)₂ 6H₂O

Not less than 97 5 per cent should be indicated

ANALAR

COBALT OXIDE

A variable muxture of

 $Co_2O_3 = 16588$ and $Co_3O_4 = 24082$

Chloride (CI)	o or per cent
Sulphur Compounds (SO ₄)	o or per cent
Nickel (Ni)	0 04 per cent
Iron (Fe)	o 003 per cent
Alkalis and Alkaline Earths (Na)	o of per cent

- 1 Description -A greenish black powder
- 2 Solubility.—Boil 1 g with 5 ml of hydrochloric and for 1 minute and dilute with water to 50 ml. A clear solution should be obtained
- 3 Chloride.—Bod 1 g with 50 ml of water and 1 of ml dilute nitric acid, cool and filter To the filtrate add 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the stradard opalescence defined in appendix 2
- 4 Sulphur Compounds.—Boil 1 g with 3 ml of hydrochloric acid and 1 ml of nitric acid, dilute with water to 50 ml, add 5 ml of barum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 5 Nickel—Dissolve 0.5 g in 3 ml of hydrochloric acid, evaporate to dryness on a water-bath, dissolve the residue in 100 ml of a 10 per cent w/v solution of potassum throey anate and proceed as in Test No 4 in the specification for Cobalt Chloride.
- 6 Iron—Dissolve 2 g m 10 ml of hydrochloric acid and evaporate to dryness without baking Dissolve in 30 ml of water and 1 ml of dilute hydrochloric acid, add o 5 g of zinc oxide and boil for 1 minute Filter and wash with water. Dissolve the residee m_1 and m_2 dilute hydrochloric acid and 50 ml of water, add o 7 g of zinc oxide and boil for 1 minute. Filter and wash with water. Redissolve the residue in 5 ml of dilute hydrochloric acid and didute to 4 ml with water. To 20 ml add 1 ml of dilute hydrochloric acid, 1 drop of N/10 KMnO₂ and 5 ml of armonoum thocyanate solution. Any pink colour produced should not be greater than that obtained by treating 6 ml for standard iron solution find = 0 or im Fe) in a similar manner.

7 Alkalıs and Alkalıne Earths —Dissolve 2 g in 10 ml of hydro chloric acid add 50 ml of water, 12 g of ammonium chloride and a slight excess of dilute ammonia solution and precipitate the cobalt with hydrogen sulphide filter and evaporate the filtrate to dryness. To the residue add 2 drops of sulphuric acid ignite gently and weigh the residue. Not more than 4 mg should be obtained

ANALAR COBALT SULPHATE

 $CoSO_4 7H_4O = 281 12$

Maximum Limits of Impurities

Chloride (Cl)	o oor per cent
Nitrate (NO ₄)	o coz per cent
Nickel (Ni)	o or per cent
Iron (Fe)	0 003 per cent
Zinc (Zn)	0 005 per cent
Alkalis and Alkaline Earths (Na)	0 03 per cent

- I Description —Small red crystals or crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear pink solution should be produced
- 3 Chloride—Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 4 Nitrate —Dissolve 1 g in 10 rul of water add 1 ml of standard undgo solution and 10 ml of sulphure acid and heat to boiling. The colour of the resulting solution should be a bluer shade of purple than that obtained by treating 1 g with 10 ml of water and 10 ml of sulphure acid and heating to boiling.
- 5 Nickel —Dissolve $2 \ g$ m 100 ml of a 10 per cent w/v solution of potassium thouganate and proceed as in Test No. 4 in the specification for Cobalt Chloride
- 6-8 Tests for Iron, Zinc, Alkalis and Alkaline Earths are carned out as described for Cobalt Chloride
 - 9 Assay Carry out the assay as described for Cobalt Chloride Weight of Co × 4.769 = weight of CoSO_{4.7}H₂O

Not less than 97 5 per cent should be indicated

ANALAR COPPER

Cu = 61 54

Acid insoluble Matter	nıl
Tin (Sn)	0.001 per cent
Silver (Ag)	o oor per cent
Iron (Fe)	o or per cent
Bismuth (Bi)	o ooo6 per cent
Lead (Pb	0 002 per cent
Arsenie (As ₂ O ₂)	0 0002 per cent
	(a parts per million)

- 1 Description -A bright reddish metal
- 2 Solubility Dissolve 10 g in 30 ml of nitric acid and 30 ml of water and adjust with water to 60 ml. A clear blue solution should be produced. Retain this solution for tests 3 to 6
- 3 Tin —To 6 ml of the above solution add 6 ml of water and 4 ml of phenylarsonic acid solution (10 per cent) No turbidity sl ould be produced
- 4 Sliver —To 24 ml of the solution from Test No 2 add 50 ml of water and 1 ml of dilute hydrochloric acid No opalescence should be produced
- 5 fron—Evaporate 3 rol of the solution from Test No 2 to 1 ml dutte to no ml with water and add to ml of sulphura and Electrolyst the solution for 30 manutes with a current of 2 ampères as described in appendix 5. Remove the copper from the cathode with nutric acid, add if g of urea to the solution and electrolyse for a further 13 minutes using a current of 1 ampère. Evaporate the solution to 1 ml and dutte with water to 50 ml. To 10 ml add to ml of water 1 ml of dutte hydro chlonic acid 1 drop of N/10 kMnO, and 5 ml of farmonium theoryanate solution. Amy pink colour produced should not be deeper than that obtained by the addition of 5 ml of ammonium theoryanate solution to a solution containing 15 ml of water 1 ml of dulte hydrochlonic 2acid 1 ml of standard iron solution (1 ml 0 or mg. Fc) and 1 drop of N/10 kMnO.
- 6 Bismuth—Dissolve 1 g of aluminium ammonium sulphate in 18 ml of the solution from Test No 2 add 12 ml of water and strong ammona in sufficient excess to return all the copper in solution. Heat to boiling filter immediately and wash with hot dulute ammonia solution until the washings are colourless. Suspend the preepitate in 2 ml of water add 4 ml of nitric acid and warm until dissolved. Again add ammonia in excess filter hot and wash with dulute ammonia solution until the precripate is colourless. Suspend in 25 ml, of water add 5 ml. of

of dulute sulphume acad, boil until almost clear then add a further 6 ml of dulute sulphume acad in small portions and continue boiling until the solution is quite clear. Cool, dilute to 40 ml, add 0 r ml of sulphurous acid $^{\circ}$ and 5 ml of potassium nodide solution and dilute with water to 50 ml. Any colour produced should not be deeper than that of a solution containing 32 ml of water, 11 ml of dilute sulphume acid, 15 ml of standard bismuth solution (1 ml = 0 or mg Bi), 0 r ml of sulphurous acid and 5 ml of potassium rodde solution

- 7 Lead.—Dissolve 2 5 g in 10 ml of intine acid and 10 ml of water and to the hot solution add 0 i g of ferrous sulphate. Cool, add 100 ml of water and strong armonia solution in sufficient amount to redissolve all the copper. Filter or centrifuge and wash or extract the precipitate twice with dilute armonia solution. Redissolve in 1 ml of dilute hydrochloric acid, add armonia in excess and again filter or centrifuge. Redissolve the precipitate in 1 ml of dilute hydrochloric acid and 45 ml of water, add 0.5 g of hydroxylamine bydrochloride, heat to botling, cool and dilute with water to 45 ml. Add 10 drops each of bromophenol blue and thymol blue solutions, then sodium bydroxide solution until the colour is just violet, followed by N/t H₂SO₂ until just yellow. Polarograph over the range -0.3 volt to -0.8 volt. Return the solution under test, add 0.05 ml of standard lead solution (i ml ≈ 1 mg Pb), mix well and polarograph as before. The wave height in the first experiment should be less than the increase in height to brained in the second experiment
- 8 Arsenic.—Mix 5 g with 4 g of potassium chlorate and 15 ml of water, add 20 ml of hydrochloric acid in small portions at a time until all the copper is dissolved and boil genily to remove the excess of chlorine. Add to ml of water, to ml of hydrochloric acid and sufficient stannous chloride solution to decolorise the solution, and distil 40 ml, to the distillate add 20 ml of water and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a 0 or mg standard stain.

ANALAR

CUPFERRON

(Ammonium N-Nitrosophenylhydroxylamine)

 $C_4H_4N(NO)ONH_4 = 155 15$

Maximum Limit of Impurity

Sulphated Ash

o z per cent

r Description —White to biscuit coloured crystalline flakes, readily discolouring on exposure to air or light. This decomposition is retarded by keeping a piece of ammonium carbonate in the bottle.

* Sulphurous Acid.—Prepare a saturated solution of sulphur dioxide in water at about 25" and dilute with an equal volume of water. The solution must be freshly prepared. (Communed overled)

CUPFERRON-continued

- 2 Solubility—A solution of 1 g in 50 ml of water should be no more than pale yellow and no more than slightly turbid
- 3 Sulphated Ash -- Vioisten 1 g with sulphuric acid and ignite Not more than 2 mg of residue should remain

ANALAR

CUPRIC ACETATE

(CH₁ COO)₂Cu H₂O ≈ 199 64 Maximum Limits of Impurities

Chloride (Ct)	o oor per cent
Sulphate (SO ₄)	o or per cent
Iron (Fe)	oor per cent
Alkalis and other Metals (as sulphates)	0 1 per cent
Arsenic (As ₂ O ₂)	o oor per cent
	(10 parts per million)

- Description—Dark green transparent crystals or crystalline powder
 Solubility—Dissolve I g in 50 ml of water and i ml of dilute
 acette acid A clear blue solution should be produced.
- 3 Chloride Dissolve I g in 50 ml of witer add x ml of nitno acid and x ml of silver nitrate solution. No opalescence should be produced
- 4 Sulphate Dissolve 1 g in so ml of water add 1 ml of hydro chloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 5 Iron —To 2 g add 3 ml of nutre seed followed by 3 ml of sul phurne acid Deaporate to dryness add 1 ml of nutre acid and 1 ml of sulphurne acid and heat to furning Cool, add 100 ml of water, 10 ml of sulphurne acid and 1 drop of nutre acid and electrolyse the solution for 30 minutes with a current of 2 amperes as described in appendix 5 Remove the copper from the cathode with nutre acid add 1 g of ure to the solution and electrolyse for a further 13 minutes using a current of 1 ampere. Retain 85 ml of the solution for 1 ert No. 6 To 6 ml add 15 or of of water 1 ml of ddute hydrochlone each, 1 drop of N/10 kMnO, and 5 ml of ammonium thiocyanate solution. Any pink colour produced should not be deeper than that obtained by the addition of 5 ml of ammonium thocyanate solution to a solution containing 20 ml of water 1 ml of dditte hydrochloric acid, 2 ml of standard trans solution (1 ml = 0 or 1 mg Fe) and 1 drop of N/10 kMnO,
- 6. Alkalis and other Metals—Evaporate 8, ml of the solution from Test No 5 to dryness ignite gently and weigh the residue. Not more than 1 5 mg should he obtained
- 7 Arsenic.—Heat i g with i ml of sulphune acid until fumes of sulphune acid are evolved, cool, add 5 ml of water and again heat to

fuming Cool, dissolve the residue in 20 ml of 20 per cent hydrochloric acid, add sufficient stannous chloride solution to decolorise and dissip 5 ml. To the distillate add a few drops of bromine solution remove the excess of bromine by a few drops of stannous chloride solution, add 45 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 00 m mg standard stain.

8 Assay.—Dissolve o 8 g in 50 ml of water, acidify with dilute acetic acid, add 3 g of potassium todide and tirrate the liberated todine with N/10 Na.5.O. using starch solution as indicator

r ml N/10 Na₂S₂O₃ = 0 01996 g (CH₃ COO)₂Cu H₂O Not less than 90 per cent should be indicated

ANALAR

CUPRIC AMMONIUM CHLORIDE

CuCl, 2NH4Cl 2H4O = 277 48

Maximum Limits of Impurities

Free Acid	passes	passes test	
Sulphate (SO ₄)	0 005	per cent	
Iron (Fe)	0 01	per cent	
Barrum (Ba)	100	per cent	
Alkalis and other Metals (as sulphates	ro (per cent	
Arsenic (As ₂ O ₅)	0 0005	per cent	
	(5 parts pe	milion)	

- 1 Description -Pale blue crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear blue solution should be produced
- 3 Free Acid.—Dissolve 1 g in 20 ml of water, add 0-05 ml of N/1 Na₂CO₃ and allow to stand for 15 hours A precipitate should be formed
- 4 Sulphate—Dissolve 2 g in 50 ml of water and add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 5 fron —Moisten 2 g with sulphune and and evaporate to dryness Remoisten with sulphune and and heat to fuming Dissolve the residue in 100 ml of water add 10 ml of sulphune and and 1 drop of nitric and and electrolyse the solution for 30 minutes with a current of 2 amperes as described in appendix 5 Remove the copper from the cathode with nitric and add 1, g of urea to the solution and electrolyse for a further 5 minutes sung a current of 1 amperes Retain 85 ml of the solution for Test No 7 To 6 ml add 15 ml of water, 1 ml of dilute hydrochlone and 1 drop of N/10 kNInO, 4 ml 5 ml of ammonium thocyanate solution Any pink colour produced should not be deeper than that obtained by the addition of 5 ml of ammonium thocyanate solution.

(Continued or erleaf)

CUPRIC AMMONIUM CIILORIDE—continued

containing 20 ml of water, 1 ml of dilute hydrochloric acid, 1 ml of standard iron solution (1 ml = 001 mg Fe) and 1 drop of N/10 KMnO4

- 6 Barium —Dissolve 1 g in 50 ml of water, add 1 ml of dilute sulphune acid and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 7 Alkalis and other Metals—Evaporate 85 ml of the solution from Test No 5 to dryness, ignite gently and weigh the residue Not more than 15 mg should be obtained
- 8 Arsenic—Dissolve 2 g in 10 mL of hydrochloric acid and 9 ml of water, add sufficient stanous chloride solution to decolorise and distil 15 ml. To the distillate add 45 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0 o1 mg standard stain.
- 9 Assay.—Dissolve t g in 50 ml of water, add 5 ml of dilute acetic acid and 3 g of potassium iodide and titrate the liberated iodine with N/10 Na₂S₂O₂ using starch solution as indicator
- I ml N/10 Na₂S₂O₃ = 0 02775 g CuCl₂ 2NH₄Cl.2H₂O Not less than 99 per cent should be indicated

ANALAR

CUPRIC CHLORIDE

 $CuCl_{2}H_{2}O = 17049$

Maximum Lamits of Impunties

Sulphate (SO ₄)	0.01	per cent
Iron (Fe)	9 92	per cent
Barrum (Ba)		per cent
Alkalis and other Metals (as sulphates)		per cent
Oxygen absorbed (O)	800 0	per cent
Arsenic (As ₂ O ₃)	0 0005	per cent

(5 parts per million)

- Description Moist blue, bluish green or green crystals
- 2 Solubility —Dissolve 5 g m 50 ml of 90 per cent ethyl alcohol, a clear green solution should be produced Dissolve 5 g in 10 ml of water, a clear deep green solution should be produced which on dilution to 0 ml becomes blue
- 3 Sulphate Dissolve 1 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of barum chloride solution and allow to stand for 1 bour No turbidity or precipitate should be produced
- 4 Iron Moisten 2 g with sulphune acid and evaporate to dryness Remoisten with sulphune acid and heat to furning Dissolve the residue in 100 ml of water, add 10 ml of sulphune acid and 1 drop of nitric acid

and electrolyse the solution for 30 minutes with a current of 2 amperes as described in appendix 5. Remove the copper from the cathode with nitric acid, add 1 g of ure to the solution and electrolyse for a further 15 minutes using a current of 1 ampere. Retain 85 ml of the solution for Test No. 6. To 3 ml add 18 ml of vater, 1 ml of dilute hydrochloric acid, 1 drop of N/10 KMnO₁ and 5 ml of ammonium thico; anate solution. Any pink colour produced should not be deeper than that obtained by the addition of 5 ml of ammonium thocyanate solution to a solution containing 20 ml of water, 1 ml of dilute hydrochloric acid, 1 ml of standard iron solution (1 ml = 0 o 1 mg Fe) and 1 drop of N/10 KMnO₄,

- 5 Bartum —Dissolve 1 g in 20 ml of water, add 0 5 ml of dilute sulphuric acid and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 6 Alkalis and other Metals --Evaporate 85 ml of the solution from Test No 4 to drynes, ignite gently and weigh the residue Not more than 1 mg should be obtained
- 7 Oxygen Absorption—Dissolve 5 g in 50 ml of water, add 5 ml of dilute hydrochloric acid and titrate with N/10 KMnO₄ using 0 tolidine as indicator · Not more than 0.5 ml of N/10 KMnO₄ should be required
- 8 Arsente Dissolve 2 g in 10 ml of hydrochloric and and 9 ml of water, add sufficient stanous chloride solution to decolorise and distil 15 ml. To the distillate add 45 ml of water and a few drops of stanous chloride solution and tests as described in appendix 4. Any stain produced should not be greater than a 001 mg standard stain.

9 Assay.—Dissolve 0.8 g in 25 ml of water, add 5 ml of dilute acetic acid and 3 g of potassium solded and titrate the liberated iodine with N/10 Na₂S₂O₃ using starch solution as indicator

Not less than 98 per cent should be indicated

Chloride (CI)

ANALAR CUPRIC NITRATE

 $Cu(NO_3)_2 3H_2O = 241 60$

Maximum Limits of Impurities

Iron (Fe)	0.02	per cent
Banum (Ba)	100	per cent
Alkalis and other Metals (as sulphates)	o z	per cent
Arsenic (As ₂ O ₃)	0 0005	per cent
(5 parts pe	r million)

(Continued or erleaf)

O DOT THE CENT

ANALAR STANDARDS

CUPRIC AITR ITF-continued

- r Description —Hygroscopic blue crystals having an odour of nitric acid
- 2 Solubility —Dissolve 5 g m 50 ml of water A clear blue solution should be produced
- 3 Chloride Dissolve I g in 50 ml of water and add I ml of dilute nitric acid and I ml of silver mitrate solution. No opalescence should be produced.
- 4 Sulphate —Dissolve 5 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 6 hours. No turbulet or or great the should be produced.
- 5 Iron —Dissolve 2 g in 100 ml of water add 10 ml of sulphune acid and electrolyse the solution for 30 minutes with a current of 2 amperes as described in appendix 5. Remove the copper from the cathode with nitric acid add 1 g of urea to the solution and electrolyse for a further 15 minutes using a current of 1 ampere Retain 85 ml of the solution for Test No. 7. To 3 ml add 20 ml of water 1 ml of dilute hydrochloric acid rdop of N/10 KMnO, and 5, ml of minorium thocyanate solution Any pink colour produced should not be deeper than that obtained by adding 5 ml of ammonium thocyanate solution to assolution that is obtained as the solution of water 1 ml of dulute hydrochloric acid 1 ml of standard iron solution (1 ml 0 of ure Fe) and 1 drop of N/10 KMnO.
- 6 Barrum —Dissolve 1 g in 50 ml of water add 0.5 ml of dilute sulphure acid and allow to stand for 1 bour No turbidity or precipitate should be produced
- 7 Alkalis and other Metals—Evaporate 85 ml of the solution from Test No 5 to dryness ignite gently and weigh the residue. Not more than 3 mg should be obtained
- 8 Arsenic—Heat 2 g with 3 ml of sulphune acid in a porcelain dish until firmes of sulphune acid are evolved cool add 5 ml of water and again heat to firming Cool dissolve the residue in 20 ml of 20 per cent. hydrochloric acid add sufficient stannous chloride solution to decolorise and distil 15 ml. To the distillate add a few drops of bromine solution remove the excess of bromine by a few drops of stannous chloride solution add 45 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 00 m g standard stain.
 - 9 Assay —Ignite r g and weigh the resulting CuO Weight of CuO × 2 038 = weight of Cu(NO₂), 3H O

Not less than 95 per cent should be indicated

ANALAR CUPRIC OXIDE

CuO = 79 54

Maximum Limits of Impurities

Water-soluble Matter	0 05	per cent
Chlorade (Cl)	0 005	per cent
Sulphate (SO ₄)	0 03	per cent
Nitrate	no reaction	
Cuprous Oxide (Cu ₂ O)	0 05	per cent
Iron (Fe)	01	per cent
Alkalia and other Metals (as sulphates)	05	per cent
Arsenic (As ₂ O ₃)	0 003	per cent
(301	parts pe	r million)

1 Description.-A black powder

- 2 Solubility.—Insoluble in water Dissolve 5 g in 15 ml of hydrochloric acid and dilute to 50 ml with water, a green, not more than slightly turbid, solution should he produced
- 3 Water-soluble Matter.—Boil 2 g with 20 ml of water for 1 munute and filter, the filtrate should he neutral to htmus paper Evaporate the filtrate to dryness, ignite the residue gently and weigh. Not more than 1 mg should he obtained.
- 4 Chloride —Dissolve 2 g in 20 ml of warm dilute miric acid, cool, dilute with 30 ml of water and add 1 ml of silver nitrate solution Any opalescence produced should not he greater than the "standard opalescence" defined in appendix 2
- 5 Sulphate Dissolve 1 g in 7 ml of warm dilute hydrochloric acid, cool, dilute to 50 ml with water, add 1 ml of banum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 6 Nitrate.—Heat 5 g in a test-tube, in the mouth of which is placed a piece of moist blue litmus paper. The paper should remain blue
- 7 Cuprous Oxide—Dissolve 1 g in 7 ml of hot dilute hydrochloric acid, cool, add 50 ml of water and titrate with N/10 KMinO₄, using 0 tolidine as indicator Not more than 0.1 ml of N/10 KMinO₄ should be required
- 8 Iron —Dissolve 1 g in 5 ml of dilute mitro acid, add 100 ml of water and 10 ml of sulphure acid and electrolyse the solution for 30 minutes with a current of 2 amperes as described in appendix 5. Remove the copper from the cathode with nature acid, add 1 g of use 10 to the solution and electrolyse for a further 15 minutes with a current of 1 ampere Retain 90 ml of the solution for Test No g To rim a did 2 or ml of water 1 ml of distute hydrochlorus acid, and 1 drop of N/10 KMinO₂ and 5 ml.

(Continued overleaf)

CUPRIC OXIDE-continued

of ammonium thiocyanate solution Any pink colour produced should not be deeper than that obtained by the addition of 5 ml of ammonium thiocyanate solution to a solution containing 20 ml of water, 1 ml of dilute hydrochloric seid, 1 ml of standard iron solution (1 ml = 0 or mg Fe) and 1 drop of N/ho KMnO.

- 9 Alkalis and other Metals Evaporate 90 ml of the solution from Test No 8 to dryness Ignite gently and weigh the residue Not more than 4 mg should be obtained.
- 10 Arsenic.—Dissolve 0 3 g in 20 ml of 20 per cent hydrochloric acid, add sufficient stannous chloride solution to decolorise and distill 15 ml. To the distillate add 40 ml of water and test as described in appendix 4. Any stam produced should not be greater than a 0 o1 mg standard stan.
- 11 Assay.—Dissolve 0.3 g in 10 ml of dilute hydrochlone acid, dilute to 50 ml with water, add 3 g of potassium iodide and iterate the liberated iodine with N/10 Na,8,0, using starch solution as indicator

Not less than 97 5 per cent should be indicated

ANALAR

CUPRIC SULPHATE

CuSO, 5H,O = 249 69

Maximum Limits of Impurities

Chlorde (Cl) 0001 per cent 1001 fron (Fe) 015 per cent 1001 fron Alkalis and other Metals (as sulphates) 01 per cent. Arsenic (As₂O₃) 0001 per cent 1001 per cent 1001

(ro parts per million

Description.—Blue crystals or a crystalline powder

- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear blue solution should be produced which should remain free from sediment on standing for 2 hours.
- 3 Chloride—Dissolve I g in 50 ml of water and add I ml of dilute nitric acid and I ml of silver nitrate solution. No opalescence should be produced
- 4 Iron—Dissolve 2 g in 100 ml of water, add 1 drop of nitric acid and 10 ml of sulphure acid and electrolyse the solution for 30 minutes with a current of 2 amperes as described in appendix 5. Remove the copper from the cathode with mitric acid, add 1 g of urea to the solution and electrolyse for a further 15 minutes using a current of 1 ampere Retain 8 g ml of the solution for Test No 5. To 4 ml add 20 ml of

water, 1 ml of dilute hydrochlone acid, 1 drop of N/10 kMnO₂ and 5 ml. of ammonium thiocyanate solution Any pink colour produced should not be deeper than that obtained by adding 5 ml of ammonium thiocyanate solution to a solution containing 20 ml of water 1 ml of dilute hydrochlone acid 1 ml of standard iron solution (1 ml == 0 01 mg Fe) and 1 drop of N/10 kMnO₄

- 5 Alkalis and other Metals—Evaporate 85 ml of the solution from Test No 4 to dryness ignite gently and weigh the residue. Not more than 15 mg should be obtained
- 6 Arsenic—Dissolve I g m 20 ml of 20 per cent hydrochloric and add sufficient stannous chloride solution to decolorise and distil 15 ml. To the distillate add a few drops of bromine solution remove the excess of bromine by a few drops of stannous chloride solution add 40 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0-01 mg standard stain
- 7 Assay —Dissolve 1 g in 25 ml of water add 5 ml of dilute acetic aced and 3 g of potassium todide and itriate the liberated todine with N/10 Na₂S₂O₂ using stareb solution as indicator

Not less than 99 per cent should be indicated

ANALAR CUPROUS CHLORIDE

CuCl = 99 00

Sulphate (SO ₄)	0 05	per cent
Iron (Fe)	0 01	per cent
Cupric Chloride (CuCl ₂)	10	per cent
Alkalis and other Metals (as sulphates)	0 25	per cent
Arsenic (As ₂ O ₃)		per cent
(10	parts pe	r milion)

- Description —A greyish white crystalline powder becoming pale green on storage
- 2 Solubility—Almost insoluble in water. Soluble in ammona solution Dissolve 1 g in 10 ml of bydrochloric acid and dilute to 50 ml with water a clear, colouriess to pale green solution should be produced
- 3 Sulphate.—Warm 1 g with 20 ml of water 3 ml of diduce hydrochione acid and 5 ml of hydrogen personde (20 volumes) until solution is complete. Cool add 20 ml. of water and 1 ml of barrum chloride solution and allow to stand for 1 bour. No turbidity or precipitate should be noduced.

CUPROUS CHLORIDE continued

- 4 Iron—Evaporate 40 ml of the solution from which the copper has been removed in Test No. 8 until the volume is reduced to 1 ml Cool dilute the residue to 25 ml and add 1 ml of dilute hydrochloric acid 1 drop of N/10 KMnO₂ and 5 ml of ammonium thiocyanate solution Any pink colour produced should not be deeper than that obtained by adding 5 ml of ammonium thiocyanate solution to a solution containing 25 ml of water 1 ml of dilute hydrochloric acid 1 ml of standard iron solution (1 ml = 0 o 1 mg Fe) and 1 drop of N/10 kMnO₂.
- 5 Cupric Chloride —Susp-nd 2 g in 20 ml of water add 5 ml of dilute acetic acid and 2 g of potassium nodide and titrate the liberated rodine with N/10 Na₂SO₂ using starch solution as indicator Not more than 15 ml of N/10 Na₂SO₃ should be required
- 6 Arsenic Dissolve r g m 20 ml of 20 per cent hydrochloric acid add a few drops of stannous chloride solution and distil r g ml. To the distillate add 45 ml of water and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be creater than a 00 me standard stain.
- 7 Alkalis and other Metals—Evaporate the remainder (160 ml) of the solution from Test No 8 to dryness ignite gently and weigh the residue Not more than 1 mg should be obtained
- 8 Assay Dissolve 0.5 g in a mixture of 20 ml of hydrogen peroxide (20 volumes) and 15 ml of sulphure and exporate to finning cool add 1 ml of nitree acid dilute with water to 200 ml and add 1 g of urea Electrolyse the solution for 45 minutes with a current of 3 amperes as described in appendix 5 Wash the cathode with water then with sectione dry and weigh Deduct the weight of copper derived from the cupric ehlonde content as determined in Test No 5 (1 ml N/10 Na S₂O₃ ooofs15 g Cu)

Weight of Cu × 1 558 weight of CuCl

Not less than 97 per cent should be indicated

ANALAR

DIGITONIN

C35H2020 = 1215 27

Meanman Lames of Impartites

Sulphated Ash Mosture 5 o per cent

1 Description -A white or cream coloured powder

Solubility —Slightly soluble in water Dissolve 0.5 g in 50 ml of 92 per cent alcohol A clear colourless solution should be obtained

- 3 Specific Rotation.—[a] not more than -50° in 75 per cent acetic acid solution
- 4 Sulphated Ash -- Moisten 1 g with sulphuric acid and ignite gently. Not more than 3 mg of residue should be left
- 5 Moisture Dry 0 5 g at 110° for 1 hour. The loss in weight should not exceed 25 mg
- 6 Assay.—Dissolve o 2 g of the dried material from Test No 5 in 20 ml of 95 per cent alcohol add a slight excess of a 1 per cent solution of cholesterol in 95 per cent alcohol (about 15 ml) and allow to stand overnight Filter on a weighed sintered glass crucible, wash with about to ml of cold 95 per cent alcohol dry at 80° and reweigh To the weight obtained add o oot 6 g for each to ml in the final volume of liquid

Corrected weight of precipitate × 0 7588 = weight of C₅₀H₉₀O₂₉

Not less than 95 per cent should be indicated

ANALAR

₽-DIMETHYLAMINOBENZALDEHYDE

 $(CH_3)_3N C_6H_4 CHO = 149 19$

Maximum Limits of Impurities

Sulphated Ash
Organic Impurities
Bases of Indole type

o os per cent passes tests no reaction

- 1 Description.-A white or pale yellow crystalline powder
- 2 Solubility.—Readily soluble in dilute hydrochloric acid Dissolve 5 g in 50 ml of 90 per cent ethyl alcohol, a clear yellow solution should be produced
 - 3 Melting Point .-- 73° to 75°
- 4 Sulphated Ash -- Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Organic Impurities.—(a) Dissolve x g in 20 ml of dilute hydrochloric acid A clear solution, with no red or brown tint, should be obtained
- (b) Dissolve o z g in zo ml of sulphuric acid. The colour of the solution should not be more than very pale brownish-yellow
- 6 Bases of Indole Type.—Dissolve ooz g in 04 ml of hydrochloric acid and 2 ml of absolute alcohol and add 4 ml of water, 0 and of a saturated aqueous solution of potassium persulphate and 3 ml of impl alcohol Shake and allow to separate No pink colour should develop within 10 minutes

ANALAR

DIMETHYLANILINE

C.H.N(CH.) = 121 18

Maximum Limits of Impunities

Hydrocarbons
Amine and Methyland ne

no reaction 0 2 per cent

- I Description.—A clear only liquid almost colourless when freshly distilled darkening to a reddish brown colour on keeping
- 2 Acid insoluble matter (H3drocarbons) Dissolve 5 ml in a mixture of 15 ml of dilute hydrochloric acid and to ml of water. On cooling the solution to 10° no turbidity should be produced
 - 3 Weight per ml at 20° 0 954 to 0 958 g
 - 4 Refractive Index 120 1 555 to 1 558
 - Freezing Point.—Not below 1°
- 6 Boiling Range —Not less than 95 per cent should distil between 192° and 194°
- 7 Antime and Methylantime—Mix 25 g with 20 ml of s to per cent v/v solution of acetic anhydrode in benzene allow to stand in a stoppered flast for 30 minutes add 50 ml of N/I NaOH shake well and titrate with N/I HCl using phenolphthalein as indicator. Carry out a blank determination in the same manner omitting the dimethylantime. The difference between the titrations should not exceed 0.5 ml.

ANALAR

DIMETHYLGLYOXIME

CH₂ C(NOH) C(NOH) CH₂ = 116 12

Maximum Limit of Impurity

o os per cent

Description -- A white cry talline powder

Sulphated Ash

- 2 Solubility —Almost insoluble in water Dissolve i g in 50 ml of boiling 90 per cent ethyl alcohol a clear colourless solution should be produced.
 - 3 Melting Point,-237° to 240° with decomposition
- 4 Sulphated Ash -- Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Assay —Dissolve 0.2 g in 20 ml of warm ethyl alcol ol and to the solution add a boiling solution of 0.3 g of nickel sulphate dissolved

in 100 ml of water, then add I g of sadium acetate dissolved in 10 ml of water and allow to stand for 1 hour Filter off the precipitate in a Gooch crucible, wash with a little water containing I drop of dilute ammonia solution, dry at 110° and weigh

Weight of precipitate X o 8038 = weight of C.H.O.N.

Not less than 98 per cent should be indicated

ANALAR

DIMETHYL YELLOW (&-Dimethylaminoazobenzene)

→H range . . . 28 to 46

(CH₃)₂N C₄H₄ N N C₄H₄ = 225 28

Maximum Limits of Impurities

Alcohol insoluble Matter Sulphated Ash

nıİ 0 2 per cent

Moisture

- I o per cent 1 Description -Golden brown crystals or crystalline powder
- 2 Solubility.-Almost insoluble in water Dissolve o i g in 50 ml of warm or per cent alcohol, a clear orange solution should be produced
 - 3 Melting Point,-116° to 118°
- 4 Sulphated Ash -- Moisten 1 g with sulphuric acid and ignite gently Not more than 2 mg of residue should be left
- 5 Sensitivity -To 50 ml of water add 0 of ml of N/10 NaOH and o I ml of the solution from Test No 2, a clear yellow solution should be produced which should change to pink on the addition of o s ml of N/10 HCl
- 6 Moisture Dry 1 g at 100° for 1 hour 'The loss in weight should not exceed 10 mg
- 7 Assay —Dissolve 0.7 g of the dried material from Test No 6 m alcohol and dilute to 250 ml with further alcohol To 50 ml add 15 g of sodium hydrogen tartrate dissolved in 80 ml of water Boil and titrate the hot solution, slowly with shaking with N/10 TiCl, in an inert atmosphere, until the solution is largely decolorised. Boil the solution again and continue the titration until complete decolorisation has occurred. Run an auxiliary determination using 10 ml of the solution, 40 ml of alcohol and 15 g of sodium hydrogen tartrate dissolved in 80 ml of water

$$I \text{ ml } N/I0 \text{ TiCl}_3 \equiv 0.005633 \text{ g } C_{14}H_{15}N_3$$

Not less than or per cent should be indicated

ANALAR 3:5-DINITROBENZOYL CHLORIDE

(NO₂)₂C₂H₂ COCI = 230 57

Maximum Limits of Impurities

Sulphated Ash Phosphorus Compounds (P) Sulphur Compounds (S) 0 05 per cent 0 0025 per cent

- Description.—Yellow crystalline needles decomposing in moist air Decomposed by water or by alcohol
- 2 Melting Point .-- 67° to 69°
- 3 Sulphated Ash.—Ignate 2 g gently until fully charred, moisten with sulphunc acid and gently reignate. Not more than 1 mg of residue should be left.
- 4 Phosphorus Compounds—Boil 1g with 1ml of water and 2 ml of intine acid for 1 minute, add 20 ml of water, cool and filter, to the filtrate add 10 ml of ammonum nitro-molybdate solution and maintain at about 40° for two hours. No yellow precipitate should be produced 5 Sulphur Compounds—Boil 1g with 1 ml of water and 2 ml of
- natric acid for 1 minute, add 25 ml of water, cool and filter to the filtrate add 20 ml of water and 1 ml nf barium chloride solution and allow to stand for one hour. No turbudity or precipicate should be produced
- 6 Assay.—Dissolve 0.5 g in 20 ml of pyridine, add very slowly 20 ml of water and titrate with N/10 NaOH using phenolphthalein as indicator,

s ml of N/so NaOl1 = 0 oss53 g (NOs)2CaH3 COCI

Not less than 99 per cent should be indicated. To the neutralised solution add 20 ml of intric acid and 25 ml of N/10 AgNO₃. Filter, wash with water and titrate the filtrate and washings with N/10 NH,SCN using ferric ammonium sulphate as indicator

1 ml of N/10 AgNO, = 0 02306 g (NO2), C, H, COCI

Not less than 90 per cent should be indicated

ANALAR

2:4DINITROPHENYLHYDRAZINE

(NO1),C4H, NH NH1 = 198 14

Maximum Limit of Impurity

Sulphated Ash . . 0 05 per cent

I Description.-Red crystals or orange-red crystalline powder.

- 2 Solubility.—Insoluble in water and in ether Dissolve 0 5 g in 1 ml of warm sulphune acid, carefully add 10 ml of alcohol, and warm gently A clear orange-red solution should be produced
 - 3 Melting Point.-194° to 199° with decomposition
- 4 Sulphated Ash.—Ignite 2 g gently until fully charred, moisten with sulphuric acid and gently reignite. Not more than 1 mg of residue should be left

ANALAR DIOXAN (Diethylene Dioxide)

CH, CH, O CH, CH, O = 88 10

Maximum Limits of Impurities

Acetal (CH₃ C(OC₃H₃)₂) 1 c

Acetal (CH₃ C(OC₂H₃)₂)

Peroxide (H₂O₃)

Water

1 o per cent
0 0015 per cent
0 4 per cent

- 1 Description.-A clear colourless liquid with a characteristic odour
- 2 Solubility.—Miscible with water, alcohol and other in all proportions to give clear colourless solutions
 - 3 Weight per ml. at 20°-1 030 to 1 035 g
 - 4 Refractive Index at 20° .- 1 419 to 1 425
 - 5 Freezing Paint -Not below 11 5°
- 6 Boiling Range.*—Not less than 97 per cent should distil between 101° and 103°
- 7 Acetal.—Dissolve 7 g of hydrovylamine hydrochloride in 100 ml of water, add a few drops of bromophenol blue and titrate to the full blue colour with N/10 NaOH. Weigh 2 g of the sample, add 50 ml of dilute sulphure acid and 50 ml of water and distil half the bulk, collecting the distillate in the neutralised hydroxylamine solution. Stopper the receiver and allow to stand for 1 hour with occasional shaking. Add 20 ml of peruheum einer (60° to 80°) and itrate with N/10 NaOH to the same blue colour as before, shaking vigorously during the titration. Run a blank, omitting the dioxan. The difference between the two titrations should not exceed 17 ml.
- 8 Peroxide.—Add 5 ml to 10 ml of potassium iodide solution and 5 ml of dilute hydrochloric acid, mx and add t ml of starch solution Any blue or brown colour prinduced should be completely discharged by the addition of 0.05 ml of N/10 $Na_2S_2O_3$

^{*} It is dangerous to determine the boiling range of samples that do not comply with Test No 8 for peroxide

DIOXAN (Diethy lene dioxide) continued

9 Water.—Titrate 20 ml of methyl alcohol, electrometrically, with Karl Fischer reagent, then add 20 g of the sample and again itrate with Karl I Fischer reagent until a small excess is present and a permanent todine colour has been established Immediately back itrate this excess, electrometrically, with a standard solution of water in methyl alcohol The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 80 mg of water

ANALAR

DIPHENYLAMINE

 $(C_4H_4)_2NH = 16922$

Maximum Limits of Impurities

Sulphated Ash 0 02 per cent
Nitrate no reaction
Sensitivity to Nitrate (NOs) 1 160 000 minimum

- Description —White crystals with a characteristic odour
- 2 Solubility—Readily soluble in other Dissolve 1 g in 50 ml of po per cent ethyl alcohol, 2 clear colourless solution should be produced
 - 3 Melting Point -54° to 55°
- 4 Sulphated Ash -Moisten 25 g with sulphuric acid and ignite gently Not more than 05 mg of residue should be left
- 5 Nitrate Dilute 6 ml of sulphure acid with 2 ml of water, cool to about 60° and add 1 drop of hydrochloric acid and 1 mg of the diphenylamine No blue colour should be produced
- 6 Sensitivity —To the solution produced in Test No 5 add o 2 ml of M/10 coo KNO₃ (= 0 cor mg NO₃) and allow to stand for 5 minutes A blue calour should be produced.

ANALAR

DIPHENYLBENZIDINE

 C_6H_4 NH C_6H_4 C_9H_4 NH $C_4H_6 = 33641$

Maximum Limits of Impurities

Sulphated Ash 0 I per cent Nutrate no reaction

Sensitivity to Nitrate (NO₂) z 5,000,000 minimum

- I Description.-White to faintly grey or buff crystalline powder.
- 2 Melting Point -- 246° to 250°
- 3 Sulphated Ash —Moisten 0.5 g with sulphuric acid and ignite gently. Not more than 0.5 mg of residue should be left
- 4 Nitrate.—Dissolve 8 mg in a cooled mixture of 45 ml of sulphuric acid, mitrogen free, and 5 ml of water. The solution should be colourless or only very family blue.
- 5. Sensitivity to Nıtrate.—To 2 5 ml of M/300,000 KNO, solution add 1 5 ml of the solution prepared in Test No 4 followed by 6 ml of nitrogen-free sulphune acid, and mix A definite blue colour should be observed on comparing with a solution containing 2 5 ml of water, 1 5 ml of the reagent solution and 6 ml of nitrogen-free sulphune acid

ANALAR

sym-DIPHENYLCARBAZIDE

 C_6H_5 NH NH CO NH NH $C_6H_5 = 242 27$

Maximum Limit of Impurity

Sulphated Ash

o of per cent

Sensitivity to Chromate (CrO₄) 1 5,000,000 minimum

- I Description --White to cream coloured crystalline powder slowly becoming pink on exposure to air
- 2 Solubility.—Almost insoluble in water Dissolve 2 g in 50 ml of 95 per cent alcohol A clear solution, not more than faintly jellow, should be produced
 - 3 Melting Point.-165° to 169°
- 4 Sulphated Ash.—Moisten 1 g with sulphuric acid and ignite gently. Not more than 0 5 mg of residue should be left
- 5 Sensitivity to Chromate.—Dilute 0 5 ml of N/10 K,Ct₂O, with water to 1 litre Dilute 5 ml of this solution to 50 ml and add 3 drops of dilute hydrochloric acid and 0 5 ml of a solution of the diphenylcarbazide made by dissolving 0 2 g in 10 ml of acetic acid and diluting to 100 ml with water The colour produced within 5 minutes should be reddish violet when compared with a solution containing 50 ml of water, 3 drops of dilute hydrochloric acid and 0 s ml of the diphenylcarbazide solution.

ANGLAR

DIPHENYLTHIOCARBAZONE

(Dithizone)

C.H. N N CS NH.NH C.H. = 256 32

Maximum Limits of Impurities

Sulphated Ash Lead (Pb)

P 2 per cent O I per cent

Sensitivity to Lead (Pb) 1 20 000 000 minimum

- 1 Description -Purple black crystalline powder
- 2 Solubility -Dissolve o 1 g in 10 ml of chloroform filter through asbestos in a Gooch crucible and wash with a further 15 ml of chloro form. Not more than a trace of dark insoluble matter should remain Dilute the filtrate to 100 ml with chloroform and use this solution for Tests Nos 4 and 5
- 3 Sulphated Ash -- Moisten o 5 g with sulphure acid in a silica crucible and ignite gently. Not more than I mg of residue should remain
- 4 Lead -Shake 5 ml of the solution from Test No 2 with a mixture of 5 ml of water 2 ml of potassium cyanide solution and 2 ml of strong ammonia solution Dilute the chloroform layer with 5 ml of chloroform and wash with a nuxture containing 5 ml of water 1 ml of dilute am monia solution and 1 ml of potassium cyanide solution. The chiloroform layer may remain yellow but should bave no red tint
- Sensitivity to Lead Dilute i ml of the solution from Test No 2 with chloroform to 25 ml Add 2 ml of this solution to a mixture of o o5 ml of standard lead solution (1 ml = 0 o1 mg Pb) 10 ml of water 1 ml of potassium cyanide solution and z drops of dilute ammonia solution and shake in a glass stoppered tube. A distinct pink colour should be obtained in the chloroform layer as compared with a blank experiment from which the lead is omitted

ANAI AR

' na -DIPYRIDYL

(C,H,N), = 156 18

Maximum Limit of Impurity

Sulphated Ash o 25 per cent

Sensitivity to Iron (Fe) 1 10 000 000 minimum

I Description -White or faintly coloured crystalline powder

- 2 Solubility.—Almost insoluble in water Dissolve 1 g in 10 ml of cold N/r hydrochloric acid and dilute to 100 ml with water A clear colourless solution should be obtained
 - 3 Melting Point.-68° to 70°
- 4 Sulphated Ash.—Moisten o 2 g with sulphuric acid and ignite gently Not more than 0 5 mg of residue should remain
- 5 Sensitivity to Iron.—Add o 5 ml of the solution prepared in Test No 2 to a mixture of ro ml of water, o i ml of standard iron solution (i ml = 0 or mg Fe) and i ml of hydroxylamine hydrochloride solution (io per cent). The colour produced should be definitely pink when compared with a solution containing the same quantities of reagents but omitting the iron solution.

ANALAR

ESCHKA'S MIXTURE

A mixture of 1 part by weight of sodium carbonate (anhydrous) and 2 parts by weight of magnesium oxide

Maximum Limit of Impurity

Sulphate (SO₄) . .

o-oz per cent

1 Description .- 4 white powder

 Sulphate — Dissolve 2 g in 25 ml of water and 25 ml of dilute bydrochloric and, add 1 ml of barnim chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.

ANALAR ETHER

(C.H.),0 = 74 12

Maximum Limits of Impurities

r Description,—A clear colourless mobile liquid with a characteristic odour.

(Continued overleaf)

FTHER-continued

- 2 Solubility.—Soluble in about to parts of water Miscible with alcohol in all proportions
 - 3 Weight per ml, at 200 .- 0713 to 0715 g
 - 4 Refractive Index -- 120 1 350 to 1 353
- 5 Bolling Range. —Not less than 95 per cent should distil between 34° and 35°
- 6 Non-volatile Matter Evaporate 70 ml to dryness on a waterbath Not more than 0 5 mg of residue should be left
- 7 Acldrty—Heat 20 ml with 5 ml of neutral distilled water on a water-bath until the ether has evaporated, continue to heat for a further 5 minutes, then add 0 2 ml of neutral methyl red solution and compare the resulting colour with 5 ml of the same water to which 0 2 ml of neutral methyl red solution has been added. The colour should not show any change towards red
- 8 Aldehyde, Acetone and Vinyl Compounds—Place 5 ml of Nessler's reagent in a stoppered bottle of 30 ml capacity and fill the bottle completely with the sample of ether, insert the stopper, shake well and allow to stand for 5 minutes No colour or turbidity should be produced
- o Ether Peroxide —Place to ml of ferrous thiocyanate reagent in a go ml stoppered bottle previously filled with carbon dioxide, completely fill the bottle with the sample of ether, ussert the stopper so that no bubble of air is enclosed shake vigorously and allow to stand in the dark for ymnutes No distinct pink colour should be produced.
- 5 manuers for assumer pairs conour smooth be produced to Water —Thirtte 20 ml of methyl alcohol, electrometrically, with harf Fischer reagent, then add 20 g of the sample and again titrate with Karf Fischer reagent until a small eveces is present and a permanent rodine colour has been established Immediately back titrate this excess, electrometrically, with a standard solution of water in methyl alcohol The volume of Karf Vischer reagent used after the addition of the sample should be equivalent to not more than 80 mg of water
- It is dangerous to determine boshing range and non volatile matter on samples that do not comply with Test No 9 for peroxide
- + Ferrous Thiosyanate Reagent Danolve 2 g of pure tron vore in 40 ml of dulute sulphure aced and 40 on 10 d water decant the solution and into which 6 g of potass um to ocyanate d stolved in 60 ral of sur free water. The reagent which should be colourless, may be stored in an atmosphere free from surgeon.

ANALAR

ETHYL ACETATE

 $CH_s COOC_sH_s = 88 10$

Maximum Limits of Impurities

Non volatile Matter Free Acid Organic Impurities Water o 0025 per cent
1 o ml N/1 per cent
passes test
0 2 per cent

- Description —A clear colourless liquid with a characteristic odour
- 2 Solublity —Slightly soluble in water Miscible with alcohol and with ether
 - 3 Weight per ml at 20° -- 0 900 to 0-902 g
 - 4 Refractive Index -- n, 1 371 to 1 373
- 5 Boiling Range -Not less than 95 per cent should distil between 76 5° and 77 5°
- 6 Non volatile Matter Evaporate 20 ml to dryness on a water bath Not more than 0 5 mg of residue should be left
- 7 Free Acid.—Dissolve 1 g in 10 ml of neutral alcohol add 0 I ml of phenolphthalein solution and titrate with N/10 KOH Not more than 0 I ml of N/10 KOH should be required to produce a pink tint
- 8 Organic Impurities —Mix 2 ml with 2 ml of sulphuric acid keeping cool the while No dark colour should be produced
- 9 Water —Titrate 20 ml of methyl alcohol electrometrically with hard Fischer reagent then add 20 g of the sample and again titrate with Karl Fischer reagent until a small excess is present and a permanent todine colour had been established Immediately back titrate this excess, electrometrically with a standard solution of water in methyl alcohol The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 40 mg of water
- to Assay —Treat 2 g with 50 ml of N/1 NaOH and allow to stand for 30 minutes in a stoppered flask. Threate the excess of alkali with N/1 HCl using phenolphthalean as indicator

1 ml N/1 NaOH = 0 08810 g CH, COQC2H3

Not less than 99 per cent should be indicated

ANALAR ETHYL ALCOHOL (99/100 per cent.)

 $C_2H_4OH = 46 o7$

Maximum Limits of Impurities

Acidity o os ml N/1 per cent Alkalınıty a os ml N/r per cent Non volatile Matter 0 0025 per cent Aldehyde 0 005 per cent Aldehydes and Letones ((CH,),CO) oors per cent Methyl Alcohol no reaction Furfural o oot per cent Fusel Oil Danses test Tannın Dosses test Vi ater per cent

- 1 Description —A clear colourless liquid with a characteristic odour 2 Solubility —\fiscible in all proportions with water forming clear
- colourless solutions

 3 Reaction Mix 10 ml with 10 ml of carbon dioxide free water, the solution should be neutral to bromothymol blue or should not require
- more than 0 os ml of N/10 NaOH or N/10 HCl to render it so 4 Specific Gravity (15 5°/15 5°) — 994 to 0 797 (corresponding to 100 to 09 3 per cent. v/v of ethyl alcohol or 100 to 89 a per cent. w/v)
 - 5 Refractive Index -no 1 3610 to 1 3620
- 6 Bolling Range —Not less than 95 per cent should distil between 77 5° and 78 5°
- 7 Non-volatile Matter Evaporate 25 ml to dryness on a water-
- bath Not more than 05 mg of residue should be left

 8 Aldehyde.—Mrx at 15° 1 ml with 1 ml of Schiff s reagent allow
- to stand at 15° for 10 minutes and then add 4 ml of water. The colour when viewed through a depth of 25 cm should not be deeper than 35 red + 10 blue (Loynbond scale)
- o Aldehydes and Ketones—Mix m a stoppered cylinder 25 ml with 25 ml of water and 50 ml of hydrovljamme hydrovlhoride reagent, allow to stand for 5 munutes and turate with N/10 NaOH to the same green colour as shown by 50 ml of the reagent contained in a similar cylinder both being viewed down the axes of the cylinders. Not more than 0.5 ml of N/10 NaOH should be required
- 10 Methyl Alcohol —Dilute 0 5 ml with water to 5 ml and add 20 ml of a solution prepared by dissolving 3 g of potassium perman

genate in a mixture of 15 ml of phosphone acid and 70 ml of water and diluting with water to 100 ml. Allow to stand for 10 minutes and decolorise by the addition of 20 ml of a 5 per cent w/s solution of oxalic acid in a cooled mixture of equal volumes of sulphuric acid and water. Add 5 ml of Schriff's reagent and allow to stand for 30 minutes. The solution should remain colourless

- 11 Furfural.—Mix 10 ml with 0 05 ml of aniline and 0.25 ml of glacial acetic acid and allow to stand for 2 hours. No red colour should be produced.
- 12 Fusel Oil —Mix 5 ml with 0 5 ml of glycerin, pour on to a piece of filter paper and allow to evaporate spontaneously. No foreign odour should be perceptible at any stage of the evaporation
- 13 Tannin.—(a) Mix 10 ml with 5 ml of dilute ammonia solution No immediate darkening should be produced
- (b) Mix 10 ml with 5 ml of sodium hydroxide solution. No immediate darkening should be produced.
- 14 Water —Titrate 10 g with Karl Fischer reagent until a small excess is present and a permanent iodine colour is established. Back titrate this excess, electrometrically with a standard solution of water in methyl alcohol. The volume of Karl Fischer reagent used should be equivalent to not more than 100 mg of water.

ANALAR ETHYL ALCOHOL (90 per cent.)

 $C_2H_4OH = 46 07$

Maximum Limits of Impurities

Acidity o og mil N/1 per cent o as ml w/z per cent Alkalınıty Non volatile Matter a oozs per cent Aldehyde 0 005 per cent Aldehydes and Letones ((CH₂)₂CO) o ous per cent Methyl Alcohol no reaction Forford o cor per cent. Fusel Oil passes test Tannin passes test

Specific Gravity (15 5°/15 5°) —0 832 to 0 835 (corresponding to 90 5 to 89 6 per cent v/v of ethyl alcohol or 86 3 to 85 2 per cent w/w)

Other Tests — The alcohol should conform to Tests Nos 1, 2, 3, 7, 8 9 10 11, 12 and 13 of Ethyl Alcohol (99/100 per cent)

ANALAR ETHYL CYANOACETATE

CN CH2 COOC2H5 = 113 11

Maximum Limits of Impurities

Free Acid Non-volatile Matter 2 0 ml of N/1 per cent 0.02 per cent

Description An almost colourless liquid

- 2 Solubility —Insoluble in water Miscible with alcohol and with ether, to give clear colourless solutions
- 3 Free Acid —Shake 2 g with 50 ml of carbon dioxide-free water and titrate with N/10 NaOH, using phenolphthalein as indicator. Not more than 0.4 ml of N/10 NaOH should be required to produce a pink tint.
 - 4 Weight per ml at 20° .- 1 060 to 1 064 g
 - 5 Refractive Index $-n_0^{pe}$ 1 413 to 1 423 6 Non-volatile Matter —Evaporate 5 ml to dryness and ignite
- gently Not more than 1 mg of residue should be left
 7 Assay—To 2g add 50 ml of water and 50 ml of sodium hydroxide
 solution and distil slowly into 50 ml of N/1 sulphune and Tittate the
 excess of and with N/1 NoOH using methyl red is indicator

t ml N/t H2SO4 = 0 1131 g of CN CH, COOC.Ha

Not less than 94 per cent should be indicated

ANALAR

FERRIC AMMONIUM SULPHATE (Iron Alum)

FeNH₄(SO₄)₂ 12H₂O = 482 21

Maximum Limits of Impurities

Chloride (CI) Ferrous Salt o oor per cent no reaction

- Description —Pale violet or almost colourless crystals or crystalline powder
- 2 Solubility—Dissolve 5 g in 50 ml of water A clear pale brown solution should be produced
- 3 Chloride Dissolve I g in 50 ml of water and add I ml of dilute nitric acid and I ml of silver nitrate solution No opalescence should be produced

- 4 Ferrous Salt —Dissolve z g in 20 ml of water and add 2 ml of dilute hydrochloric acid and z drop of potassium ferricyanide solution. No blue or green colour should be produced.
- 5 Assay.—Dissolve 2 g in 100 ml of water, add 3 ml of nitric acid, heat to beiling and add a slight excess of ammonia solution. Filter, wash the precipitate with hot water until free from sulphate, dry, ignite and weigh the resulting ferric oxide.
 - Weight of $Fe_2O_3 \times 6$ 040 = weight of $FeNH_4(SO_4)_2$ 12 H_2O

Not less than 99 per cent and not more than 101 per cent should be indicated

ANALAR

FERRIC CHLORIDE (HYDRATED)

FeCi, 6H2O = 270 32

Maximum Limits of Impurities

Free Chlorine (CI)	0 001 per cent
Sulphate (SO ₄)	0 005 per cent
Nitrate (NO ₂)	0 002 per cent
Phosphate (PO ₄)	o oo4 per cent
Ferrous Salt (Fe)	oog per cent
Copper (Cu)	0 0025 per cent
Lead (Pb)	0 005 per cent
Zinc (Zn)	oor percent
Manganese (Mn)	o i per cent
Alkalıs (Na)	oog per cent
Arseme (As ₂ O ₂)	0 0005 per cent
	fe parts per million)

- 1 Description -Brownish yellow deliquescent masses
- 2 Solubility—Dissolve to g in 10 ml of water The solution should not be more than slightly turbid and, on heating to boiling with 0.2 ml of hydrochloric acid, should become clear
- 3 Free Chlorine—Boil 5 g with 10 rol of water and expose starch iodide paper to the vapours. No blue colour should be produced
- 4 Sulphate —Dissolve 2 g m 50 ml of water add 1 ml of dilute hydrochloric and and 5 ml of barnum chloride solution and allow to stand for 6 hours No turbidity or precipitate should be produced
- 5 Nitrate Dissolve 2 g m 20 ml of water, add so ml of dilute ammonia solution and filter by suction To 15 ml of the filtrate add 5 ml of dilute sulphure acid, 1 ml of standard indigo solution and 20 ml of sulphure acid and heat to boiling The blue colour should not entirely disappear
 - 6 Phosphate -Boil 2 g with 2 ml of nitric acid and 2 ml of (Continued overleaf)

FERRIC CHLORIDF (HYDRATED)-continued

water, cool, add 20 ml of water and 10 ml of ammonium nitro-molybdate solution and maintain at 40° for z hours No yellow precipitate should be produced

- 7 Ferrous Salt —Dissolve 2 g in 100 ml of water, add 2 ml of phosphone acid and titrate with M/10 KMnO₄ using a micro-hurette Carry out a blank determination, omitting the ferric chloride. The difference between the two titrations should not exceed a 10 ml.
- 8 Preparation of Solution for Copper, Lead, Zinc, Manganese and Alkalis Tests.—Dissolve 10 g in to ml of water and 17 ml of hydrochloric aeid, add 2 drops of hydrogen peroxide (20 volumes) and shake with four successive 20 ml portions of either Exaporate the acid solution to dryness, dissolve the residue in 2 ml of dilute hydrochloric acid and 10 ml of water, filter if necessary, and dilute with water to 100 ml
- o Copper.—In 20 ml of solution 8 dissolve 1 g of curic and, add 5 ml of dilute ammonia solution and 1 ml of a 0 1 per cent aqueous solution of sodium diethyldithocarbanate and shake with three successive portions, 5 ml, 3 ml and 2 ml of earbon tetrachloride Mix the carbon tetrachloride extracts and dry with a little anhydrous sodium sulphate. Any colour produced should not be greater than that obtained by treating 15 ml of water and 5 ml of standard copper solution (1 ml = 0 or mg Cu) in the same manner
- To Lead.—In 20 ml of solution 8 dissolve 1 g of curre acid, add 5 ml of dilute ammonia solution and 1 ml of potassium exande solution, dilute with water to 50 ml and add 2 drops of sodium sulphide solution Any colour produced should not be greater than that produced by adding 2 drops of sodium sulphide solution to 50 ml of a solution containing 2 g of curre acid, 5 ml of dilute animonia solution, 1 ml of potassium cyanide solution and 10 ml of standard lead solution (1 ml = 0 or mg Ph).
- 11 Zinc.—In to ml of solution 8 dissolve 1g of citric acid, add o 1 g of resorcinol and adjust the reaction of the solution with induce ammonia solution to approximately \$\tilde{P}\$1 90, using thyrold blie as indicator. Shake vigorously with three successive 5 ml portions of a o1 per cent solution of distances in chloroform. Mix the chloroformer solutions, wash with 5 ml of water and then shake with 10 ml of \$N_1\$t. HCl. Separate and wash the acid liquid with 5 ml of elioptoriorm, transfer to a Nessler glass, add 1 g of ammonium chloride, dilute with water to 5 ml, add 1 ml of potassium ferrocyande solution and allow to stand 6 ml 5 moneties. Any nurhaday produced should not be greater than that produced by adding 1 ml of potassium ferrocyande solution to 5 ml of solution containing 1 om of of Nit HCl, 1 g of ammonium chloride and 10 ml of standard zinc solution (1 ml = 0 ot mg Zd) and allowing to stand for 1 minutes **

It is essential that the potassium ferrocyanide solution he added to the lest and comparison solutions at the same time

- 12 Manganese.—To 10 ml of solution 8 add 1 ml of sulphure acd and evaporate until all hydrochlore acid is removed. Cool, add 25 ml of water, 15 ml of nitric acid and 0 5 g of sodium bismuthate, shake occasionally during 5 minutes, dilute with water to 100 ml and allow to stand until clear or filter through asbestos or sintered glass. Any pink colour produced should not be greater than that produced by the addition of 0 9 ml of N/10 KMnQ to 100 ml of water
- 13 Alkalis.—Evaporate 35 ml of solution 8 to 10 ml, add t ml of almonium throcyanate solution and extract with two 10 ml of ammonium throcyanate solution and extract with two 10 ml portions of a mixture of equal volumes of amyl alcohol and amyl acetate. Evaporate the aqueous layer to dryness, moisten with sulphuric acid, ignite and weigh. Not more than 5 mg should be obtained.
- 14 Arsenic.—Dissolve x g in 18 ml of 20 per cent hydrochloric acid, add stannous chloride solution until the iron is completely reduced as shown by the colour of the solution Distil 15 ml, to the distillate add 40 ml of water and 5 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0 005 mg standard stain
- 15 Assay.—Dissolve 5 g in sufficient water to produce 100 ml , to 20 ml of this solution add 10 ml of water, 25 ml of hydrochloric acid and 3 g of potassium iodide, allow to stand for 3 minutes and titrate the liberated iodine with N/10 $Na_4S_2O_3$

Not less than 68 per cent should be indicated

RAIANA

FERROUS AMMONIUM SULPHATE

FeSO, (NH,)2SO, 6H2O = 392 15

- 1 Description -Pale greenish blue crystals or a crystalline powder
- 2 Solubility.—Desolve 5 g us 50 ml of freshig boiled and cooled water. An almost clear, pale yellowish-green solution should be produced.
- 3 Assay.—Dissolve 15 g in 50 ml of freshly boiled and cooled water and 20 ml of dilute sulphuric acid and titrate with N/10 KMnO4

Not less than 99 per cent and not more than 100 5 per cent should be indicated

ANALAR

FERROUS SULPHATE

FeSO, 7H,O = 278 03

Maximum Limits of Impurities

Free Acid	10 ml N/1 per cent
Chloride (Cl)	0 0005 per cent
Lead (Pb)	0 0025 per cent
Copper (Cu)	0 002 per cent
Zine (Zn)	ooi per cent
Manganese (Mn)	0.03 per cent
Alkalis and other Metals (Na)	o og per cent
Arsenic (As ₂ O ₂)	o cocos per cent
	(o 5 part per million)

- Description —Green or bluish green crystals or crystalline powder
 Solubility —Dissolve 5 g in 50 ml of freshly boiled and cooled
- 2 Squality Dissolve 5 g in 50 ml of freshly boiled and cooled water A pale yellowish green solution should be produced which should not be more than faintly turbid
- 3 Free Acid —Dissolve 5 g in 50 ml of freshly boiled and cooled water and titrate with N/10 NaOH using methyl orange as indicator. Not more than 05 ml of N/10 NaOH should be required to produce a yellow colour.
- 4 Chloride Dissolve 2 g in 45 ml of water and add 2 ml of dilute nitric acid 3 ml of hydrogen peroxide (20 volumes) and 1 ml of silver nitrate solution. No opalescence should be produced.
- 5 Polarographic Tests for Lead, Copper and Zinc. General Directions—Dissolve 30 g in water and dilute to 150 ml. Each aliquot after the specified additions and before being polarographed must be freed from on 50 ml. the passage of a stream of hydrogen for 5 minutes. In each test 2 volts instead of the normal 4 volts should be applied.
- 6 Lead —To 50 ml of solution 5 add 44 ml of water 1 ml of a 0.25 per cent, solution of gelstine and 5 rol of a 2 per cent solution of citive acid. Polarograph over the range —0.4 volt to —0.8 volt. Return the solution in the polarographic cell together with the mercury, to the solution ender test add 0.2 ml of standard lead solution [1 ml = 1 mg Ph]. mix well and polarograph as before. The wave height in the first experiment should not be greater than the increase in height obtained in the second experiment.
- 7 Copper To 50 ml of solution 5 add 20 ml of water 10 ml of a 5 per cent solution of hydroxylamine hydrochloride and 2 ml of dilute hydrochloric acid. Heat to boiling and while still warm add 2 g of

potassium thiocyanate cool, add i ml of a 0.25 per cent solution of gelatine and dilute with water to 100 ml. Polarograph 1.5 ml over the range -0.25 volt to -0.5 volt. Return the solution in the polarographic cell, together with the mercury, to the solution under test, add 0.2 ml of standard copper solution (r ml = 1 mg. Cu) and the volume of standard lead solution (t ml = 1 mg. Pb) equivalent to the amount of lead found in Test No.5, mix well and polarograph as before. The wave height in the first experiment should not be greater than the increase in height obtained in the second experiment

- 8 Zinc.—To 5 ml of solution 5 add 90 ml of water and 5 ml of a 2 per cent solution of citric acid Polatograph over the range —09 volt to —13 volt. Return the solution in the polatographic cell together with the mercury, to the solution under test, add 0 1 ml of standard cane solution (1 ml = 1 mg Zn] mm well and polarograph as before The wave height in the first experiment should not be greater than the increase in height obtained in the second experiment.
- o Manganese —Dissolve 0.5 g in 40 ml of water and 10 ml of nature acid add r g of sodium besimithate, shake occasionally during 5 minutes and allow to stand until clear or filter through abbestos or sintered glass. Any pink colour produced should not be greater than that obtained by adding r 35 ml N/too KMinO₄ to 50 ml of a solution prepared by boiling 0.5 g of lerrous sulphate with to ml of nitric acid and 20 ml of water until oxides of nitrogen cease to be evolved, cooling and diluting with water
- to Alkalis and other Metals —Dissolve 2 5 g in 9 ml of water and 6 ml of dilute hydrochloric acid and add it ml of hydrogen provide (100 vols) and 20 ml of hydrochloric acid and extract with four 20 ml portions of ether with vigorous shaking. Evaporate the ether from the aqueous layer on the water bath and concentrate to 1 ml. Dilute with 10 ml of water, add 1 ml of dilute hydrochloric acid and 5 ml of am monium thiocyanate solution and extract with two 10 ml portions of a mixture of equal volumes of amyl alcohol and amyl acctate. Evaporate the acid layer to dryness and ignite gently. Not more than 2 mg of residue should be left.
- 11 Arsenic.—Dissolve 4 g in 20 ml of 20 per cent hydrochloric acid, add a few drops of stannous chloride solution and distil 15 ml. To the dissolute add a few drops of bromne solution remove the excess of bromne by a few drops of stannous chloride solution, add 50 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0 002 mg. standard stain.
- 12 Assay —Dissolve 1 g in 50 ml of freshly boiled and cooled water and 20 ml of dilute sulphune acid and titrate with N/10 KMnO4

1 ml N/10 KMnO, = 0 0278 g FeSO, 7H2O

Not less than 99 per cent should be indicated

ANALAR FORMALDEHYDE SOLUTION

H CHO = 10001

Maximum Limits of Impurities

Acidity	3 o ml N/1 per cent
Non volatile Matter	o co25 per cent
Chlonde (Cl)	o cooz per cent
Heavy Metals (Pb) Iron (Fe)	o ooo4 per cent
Organic Impunities	0 0002 per cent
Organic imputities	passes test

1 Description — A solution of formaldehyde in water, containing about 36 per cent of formaldehyde and about 10 per cent of methyl alcohol. A colourless liquid with a strong pungent odour clear when issued. On keeping a whate precipitate of polymerised formaldehyde may separate.

- 2 Solubility Miscible with water and with alcohol forming clear colourless solutions
- 3 Acidity Dilute 10 ml with 10 ml of water and titrate with N/1 NaOH using phenolphthalein 28 iodicator Not more than 0.3 ml should be required
- 4 Non-volatile Matter Evaporate 20 ml to dryness and ignite gently Not more than 0.5 mg of residue should be left
- 5 Chloride—Dilute 5 ml, with 45 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 6 Heavy Metals and Iron —Dulute 5 ml with 40 ml of water, add 5 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "stindard colours" defined in appendix 2
- 7 Organic Impurities —Mix 10 ml with 10 ml of N/1 NaOH and allow to stand for 1 hour No colour should be produced
- 8 Assay —Mix 3 ml with 50 ml of N/1 NaOH and add a5 ml of hydrogen peroxide (20 volumes) warm on a water bath for 30 minutes with occasional staking cool and intrate the excess of alkali with N/1 HCl using phenolphiladen as indicator. Carry out a blank determination omitting the formaldehy de solution.

Each ml difference between the titrations corresponds to 1 per cent

Not less than 36 per cent w/v should be indicated

ANALAR FORMIC ACID (98/100 per cent.)

H COOH = 46 a3

Maximum Limits of Impurities

Non-volatile Matter	o or per cent
Chloride (Cl)	o cor per cent
Sulphate (SO ₄)	0 002 per cent
Heavy Metals (Pb)	o cor per cent
Iron (Fe)	o coos per cent

- 1 Description —A clear colourless liquid with a pungent odour
- 2 Solubility.—Miscible with water in all proportions forming clear colourless solutions which should not show any turbidity on standing
 - 3 Weight per ml. at 20° .-- 1 218 to 1 221 g
 - 4 Freezing Point,-Not below 4°
- 5 Non-volatile Matter.—Evaporate 8 ml to dryness on a waterbath Not more than 1 mg of residue should be left
- 6 Chloride—Dilute 8 ml with 40 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 7 Sulphate.—To 8 ml add o 2 ml of N/1 Na₂CO₃ and evaporate to dryess on a water bath, dissolve the residue in 10 ml of water and 1 ml of N/1 HCl filter if necessary, and add 1 ml of barrium chloride solution Any turbidity produced should not be greater than the 'standard turbidity' defined in appendix 2
- 8 Heavy Metals and Iron—Dilute 2 ml with 35 ml of water, add 15 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 9 Assay.—Dilute 2 g with 25 ml of water and titrate with N/1 NaOH using phenolphthalein as indicator

1 ml N/1 NaOH ≈ 0 04603 g H COOH

Not less than 98 per cent should be indicated

ANALAR FORMIC ACID (90 per cent.) H COOH = 46 03

Maximum Limits of Impurities

Non volatile Matter	oo; per cent
Chloride (CI)	o oot per cent
Sulphate (SO ₄)	0 002 per cent
Heavy Metals (Pb)	0 cos per cent
Iron (Ге)	0 0005 per cent

- t Description -- A clear colourless liquid with a pungent odour,
- 2 Solubility —Miscible with water in all proportions forming clear colourless solutions which should not show any turbidity on standing
 - 3 Weight per ml at 20°-1 202 to 1 207 g
- 4-8 Tests for Non-volatile Matter, Chloride, Sulphate, Heavy Metal and Iron, and Assay are carried out as described for Formic Acid (08/100 per cent)
 - 8 Assay -Not less than 89 5 per cent should be indicated

ANALAR FUSION MIXTURE

An equimolecular mixture of anhydrous potassium and sodium carbonates

Maximum Limits of Impurities

0 005 per cent
o cos per cent
e ee2 per cent
o cor per cent
0 005 per cent
o coz per cent
o oor per cent
o oooi per cent
(1 part per million)
2.0 per cent

1 Description -A white powder or granules

- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Chloride.—Dissolve 2 g in 40 ml of water and add 10 ml of dilute nitric acid and 1 ml of silver nitrate solution Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 4 Sulphate.—Dissolve 5 g in 100 ml of water, add 20 ml of dilute hydrochloric acid and 2 ml of banum chloride solution and allow to stand for 6 hours. No turbudty or precipitate should be produced
- 5 Nitrate.—Dissolve 1 g in to ml of dilute sulphuric acid, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat 10 boiling. The blue colour should not entirely disappear
- 6 Phosphate.—Dissolve 2 g in 10 ml of water in a platinum dish and neutralise with dilute sulphure acid (about 4 ml), add 2 ml of acid in excess and dilute to 40 ml. To 20 ml (retain the remainder of the solution for Test No 7) add 2 ml of dilute sulphure acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in appendix 2.
- 7 Silicate —To 2 ml of the solution retained from Test No 6 add 20 ml of water, r ml of dhute sulphune acid, r ml of phosphate reagent No 1 and 1 ml of phosphate reagent No. 2 and place in a water-bath at 60° for 10 mnutes. Any blue colour produced should not be deeper than the "standard colour" defined m appendix 2
- 8 Heavy Metals and Iron.—Dissolve Ig in 5 ml of dilute hydroelhoric acid, add 40 ml of water and 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- o Arsenic.—Dissolve 5 g in 50 ml of water, add 16 ml of brominated hydrochloric acid and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a o oof mg standard stain
- 10 Moisture.—Dry 3 g at about 300° for 15 minutes. The loss in weight should not exceed to mg.

ANALAR D-GLUCOSE (Dextrose)

CaH ... O. = 180 16

Maximum Limits of Impurities

Alcohol insoluble Matter	nıl
Acadity	03 ml N/1 per cent
Sulphated Ash	004 per cent
Chloride (CI)	0 005 per cent
Sulphate (SO ₄)	0 005 per cent
Sulphite (SO ₂)	0 000g per cent
Heavy Metals (Pb)	o oooz per cent
Iron (Fe)	0 0001 per cent
Arsenic (As ₁ O ₂)	o cocoz per cent
	(0 2 part per million)
Moisture	oz per cent

- r Description -A white crystalline or granular powder
- 2 Solubility —Dissolve 5 g in 50 ml of water a clear colourless solution should be produced. Dissolve 1 g in 30 ml of boiling 50 per cent ethyl alcohol a clear solution should be formed which should not deposit on cooline.
- 3 Acidity Dissolve 10 g in 100 ml of hot carbon dioude free water and tirrate with N/10 NaOH using phenolphthalein as indicator Not more than 0.4 ml of N/10 NaOH should be required.
- 4 Specific Rotation -[a]; ont less than +52" determined on a to per cent w/v well boiled aqueous solution
- 5 Sulphated Ash —Moisten 5 g with sulphuric acid and ignite gently, again moisten with sulphuric acid and reignite. Not more than 2 mg of residue should be left.
- 6 Chloride Dissolve 2 g m 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opalescence defined in appendix 2.
- 7 Sulphate Dissolve 2 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbulisty or precipitate should be produced:
- 8 Heavy Metals and Iron.—Dissolve to g in 40 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the 'standard colours' defined in appendix 2

9 Arsenic and Sulphite—Dissolie to g in 50 ml of water, add to ml of stannated hydrochloric scid and test as described in appendix 4. Any stain produced should not be greater than a 0-002 mg standard stain. The lead paper used in the test should not show any more darkening than that used in the preparation of the standard stain.

10 Moisture—Dry 5 g at 110° for 1 hour. The loss in weight should not exceed 10 mg $\,$

ANALAR

GLYCEROL CH.OH CHOH CH.OH = 92 99

Maximum Limits of Impurities

Ash	0.01	per cent
Chloride (CI)	0 0002	per cent
Sulphate (SO.)	2001	per cent
Fatty Acads	passes test	
Esters of Volatile Fatty Acids		
(Glyceryl Tributyrate)	0 025	per cent
Heavy Metals (Pb)	0 0001	per cent
Iron (Fe)	0 00005	per cent
Sugars	no reac	tion
Reducing Substances	no reac	tion
Organic Impurities	passes t	est
Arsenic (As ₂ O ₂)	0 0002	per cent
	(2 parts pe	er million)

- Description —A clear colourless syrupy liquid
- 2 Solubility Miscible with water and with alcohol forming clear colourless solutions
- 3 Reaction —The reaction of a solution of 2 ml in 10 ml of carbon dioxide free water should be neutral to litmus paper
- 4 Weight per ml at 20° -- 1 255 to 1 250 g corresponding to 98 to 100 per cent of $C_3H_3(OH)_3$
 - 5 Refractive Index -not less than 1 4696
- 6 Ash—Ignite 20 g in a platimum dish. Not more than 2 mg of residue should be left and in dissipating the last traces of glycerol not more than a slight charting should occur and there should be no odour of burnt sugar.
- 7 Chloride Dissolve 4 ml in 45 ml of water and add 1 ml of dilute mine acid and 1 ml of silver mirate solution. No opalescence should be produced.
- be produced

 8 Sulphate Dissolve 8 ml in 40 ml of water and add 1 ml of ollute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced

(Continued or erleaf)

GLYCEROL-continued

- 9 Fatty Acids.—Warm 5 ml with 5 ml of dilute sulphune acid to about 70° and shake vigorously. Not more than a faint unpleasant odour should be produced
- 10 Esters of Volatile Fatty Acids.—Mix 16 ml with 90 ml of carbon dioxide-free water and 2 ml of sodium, hydroxide solution (50 per cent w/w) and boil for 2 munutes, add 10 nd of diute sulphune acid and 40 ml of carbon dioxide-free water and distill 110 ml. Thrate the distillate with N/10 NaOH susing phenolphthalen as indicator. Not more than 0 s, ml of N/10 NaOH should be required.
- 11 Heavy Metals and Iron.—Mix 16 ml with 30 ml of water, add 5 ml of didute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 12 Sugars.—Mix 5 ml with 5 ml of water and 1 ml of dilute sulphuricacid and heat in a boiling water bath for 5 minutes, then add a ml of sodium hydroxide solution and 5 ml of Fehling's solution and heat in the same manner for a further 10 minutes No turbidity or precipitate should be onwined.
- 13 Reducing Substances —Mix 5 ml with 5 ml of dilute ammonia solution, heat to 60° for 5 mioutes, add 0 5 ml of silver intrate solution and allow to stand in the dark for 10 minutes No darkening should be
- 14 Organic Impurities.—(a) Mix 5 ml with 5 ml of aulphunc acid, keeping the mixture cold The colour produced should not be deeper than pale vellow
- (b) Mix 5 ml with 5 ml of sodium hydroride solution and heat to 50° for 5 minutes No yellow colour or unpleasant odour should be produced
- ior 5 minutes No yellow colour or unpreasant outous should be produced

 15 Arsenic.—Mix 4 ml with 50 ml of water, add 10 ml of stannated
 hydrochloric acid and test as described in appendix 4 Any stain
 produced should not be greater than a o or mg standard stain

ANALAR

GUANIDINE CARBONATE

 $[(NH_2)_1C NH]_2 H_2CO_3 = 180 17$

Maximum Limits of Impurities

Sulphated Ash
Chloride (Cl)
Sulphate (SO4)

O 2 per cent
O 2 per cent
O 3 per cent

- 1 Description .- A whate crystalline powder.
- 2 Solubility.—Dissolve 5 g in 50 ml of water. A clear colourless solution should be produced.

- 3 Sulphated Ash -- Moisten 1 g with sulphuric acid and ignite gently. Not more than 2 mg of residue should be left
- 4 Chloride—Dissolve t g in 50 ml of water and add 3 ml of dilute nitric acid and t ml of silver nitrate solution. No opalescence should be produced
- 5 Sulphate—Dissolve 1g in 50 ml of water, add 3 ml of dilute hydrochloric acid and 1 ml of barum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 6 Assay Dissolve 4 g in 100 ml of boiling water and titrate with N/1 HCl to the full yellow colour of bromocresol green

1 ml, N/1 HCl = 0 09008 g {(NH₂)₂C NH]₂ H₂CO₃

Not less than 99 8 per cent and not more than 100 2 per cent should be indicated

ANALAR

HYDRAZINE SULPHATE

NH,NH,H,SO, = 130 13

Maximum Limits of Impurities

Non volatile Matter	o og per cent
Chlonde (CI)	0 005 per cent
Heavy Metals (Pb)	o oo4 per cent
Iron (Fe)	0 002 per cent
Arsenic (As ₂ O ₃)	o ooot per cent
	(z part per million)

- 1 Description -- Colourless crystals
- 2 Solublity —Dissolve 5 g in 50 ml of hot water A clear colourless solution should be produced
- 3 Non-volatile Matter Ignite 2 g gently, not more than 1 mg of residue should be left
- 4 Chloride —Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than that given by 0.5 ml of standard chloride solution (1 ml = 0.1 mg Cl) in an equal volume of water containing the quantities of reagents used in the test.
- 5 Heavy Metals and Iron—Dissolve 0.5 g in 40 mi of water and 10 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours "defined in appendix 2
- than the standard colours" defined in appendix 2
 6 Arsenic —Dissolve 2 g in 20 ml of 20 per cent hydrochloric acid and 5 ml of water and distil 20 ml. To the distillate add 50 ml of water and a few drops of stannous chloride solution and test as described

II I DRAZINE SULPHATE-conti med in appendix 4 Any stain produced should not be greater than a

o oo2 mg standard stain 7 Assay.-(a) Dissolve 3 g in 200 ml of water and titrate with

N/1 NaOH using methyl red as indicator

1 ml N/1 NaOH = 0 1301 g NH2NH2.H2SO.

Not less than 99 per cent should be indicated

(b) Dissolve o 3 g in 25 ml of water, add 20 ml of dilute hydrochloric acid and 5 ml of potassium cyanide solution and titrate with M/20 KIO3 until the dark brown solution which is formed becomes I ght brown, then add 5 ml of starch solution and continue the titration until the hlue colour disappears

1 ml M/20 KIO, = 0 006507 g NH-NH, H-SO.

Not less than 99 per cent should be indicated

ANALAR HYDRIODIC ACID (sp. gr. 194)

HI - 127 93

Maximum Limits of Impurities

Non volatile Matter Sulphur Compounds (SO₄) O I per cent o of per cent

- I Description -A clear furning liquid varying in colour from pale vellow to dark brown owing to the presence of free rodine
- 2 Non-volatile Matter.-Evaporate 5 g to dryness on a waterbath Not more than 5 mg of residue should be left
- 3 Sulphur Compounds -Add o5 ml drop by drop to 5 ml of nitric acid and evaporate to dryness on a water hath Dissolve the residue in 1 ml of dilute hydrochloric acid and 50 ml of water, add 1 ml of harium chloride solution and allow to stand for I hour. No turbidity or precipitate should be produced
- 4 Assay -Dilute 4 g with 25 ml of water, titrate any free iodine with N/10 Na2S2O2 then titrate with N/1 NaOH using methyl red as indicator

1 ml N/1 NaOH = 0 1279 g III

Not less than 64 and not more than 68 per cent should be indicated

ANALAR HYDRIODIC ACID

(sp. gr. 1·7)

HI = 127 93

Maximum Limits of Impurities

Non volatile Matter 0 0 2 per cent
Chloride and Bromude (Cl) 0 0 3 per cent
Sulphur Compounds (SO₄) 0 0 0 5 per cent
Phosphorus Compounds (PO₄) 0 0 0 0 20 per cent

- 1 Description —A colourless liquid when freshly distilled, rapidly becomes yellow to reddish brown through liberation of iodine
 - 2 Solubility -- Miscible with water forming a clear solution
- 3 Non-volatile Matter Evaporate 5 g to dryness on a water-bath. Not more than 1 mg of residue should be left
- 4 Chloride and Bromide—To 0 2 ml add 15 ml of water, 0 05 g of sodium sulphite, 5 ml of didute ammonia solution and 20 ml of N/10 AgNO, shake and filter, to the filtrate add 10 ml of dilute nitric acid Any palescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 5 Sulphur Compounds Add 1 ml drop by drop to 5 ml of nutne acid and evaporate to dryness on a water bath Dissolve the residue in 1 ml of didute hydrochlone acid and 50 ml of water, add 1 ml of banum chlonde solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 6 Phosphorus Compounds—To the residue from Test No 3 add r drop of nitre acid and evaporate to depress on a water bath Dissolve the residue in 3 ml of dilute sulphunc acid add 20 ml of water, 1 ml of phosphate reagent No 2 and 1 ml of phosphate reagent No 2 and 1 ml of phosphate reagent No 2 and 1 ml of phosphate water bath at 60° for 10 munutes Any blue colour produced should not be deeper than the 'standard colour' for phosphate defined in appendix 2
- 7 Assay.—Dilute 5 g with 25 ml of water, titrate any free iodine with N/10 Na₂S₂O₃, then titrate with N/1 NaOH using methyl red as indicator.

1 ml N/1 NaOH = 0 1279 g HI

Not less than 54 and not more than 56 per cent should be indicated

ANALAR

HYDROBROMIC ACID

(sp. gr. 1 46 to 1.49) 46 to 48 per cent.

HBr = 80 92

Maximum Limits of Impurities

Non volatile Matter 0 02 per cent Chloride (CI) 01 per cent Sulphur Compounds (SO.) per cent Phosphorus Compounds (PO.) o cooz per cent Heavy Metals (Pb) 0 coos per cent Iron (Fe) 0 0002 per cent Banum (Ba) 0 015 per cent Arsenic (As.O.) 0'0005 per cent (5 Paris per million)

- r Description -A clear colourless or pale yellow liquid
- 2 Solubility Miscible with water and with alcohol forming clear solutions
- 3 Non-volatile Matter.—Evaporate 5 g to dryness on a water-bath Not more than 1 mg of residue should be left
- 4 Chloride —Mix 10 g with 70 ml of water and 25 ml of nitric acid, boil gently and pass a current of air through the highest until all the liberated bromine is removed Cool add to ml of Niro AgNO, filter, wash with water and thrate the filtrate and washings with Niro NH4SCN using ferme ammonium sulphate as indicator Not less than 70 ml of Niro NH4SCN should be required
- 5 Sulphur Compounds —Add 1 ml drop by drop to 5 ml of nitre acid and evaporate to dryness on a water bath Dissolve the residue in 1 ml of ddute hydrochloric acid and 50 ml of water, add 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or orientiate should be modused
- 6 Phosphorus Compounds—To the residue from Test No 3 add 1 drop of nttre actd and evaporate to dryness on a water tabl. Dissolve the residue in 3 ml of dilute sulpbure acid, add as ml of water, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and pace in a water-baif at 60 for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" for phosphate defined in appendix 2.
- 7 Heavy Metals and Iron—Dilute 5 g with 25 ml of water, add 20 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2

- 8 Barrum -Dilute 1 ml with 50 ml of water, add 1 ml dilute sulphuric acid and allow to stand for a hour. No turbidity or precipitate should be produced
- 9 Arsenic -Dilute 2 g with 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a o or mg standard stain
- 10 Assay -Dilute 5 g with 25 ml of water and titrate with N/1 NaOH using methyl red as indicator

r ml N/r NaOH = 0 08002 g HBr

Not less than 46 per cent and not more than 48 per cent should be indicated

ANALAR HYDROCHLORIC ACID

(sp. gr. 118)

HCI = 36 465

Maximum Limits of Impurities

Non volatile Matter	o cong per c	ėп
Free Chlorine (CI)	0 0002 per c	έn
Sulphate (SO ₄)	0 0003 per c	æn
Heavy Metals (Pb)	0 0002 per c	en
Iron (Fe)	0 000I per c	en
Arsenic (As ₄ O ₄)	0-000004 per c	en
	fo o4 part per mill	ior

- 1 Description -A clear colourless furning liquid
- 2 Non-volatile Matter.—Evaporate 56 ml to dryness on a water-bath and ignite gently Not more than 1 mg of residue should be left
- 3 Free Chlorine Dilute 2 ml with 20 ml of water, add 1 ml of cadmium iodide solution and I ml of starch solution and allow to stand in the dark for 10 minutes. No blue colour should be produced
- 4 Sulphate -To 56 ml add o 2 ml of N/1 Na2CO2 and evaporate to dryness on a water-bath, dissolve the residue in 10 ml of water and 1 ml of N/1 HCl filter if necessary, and add 1 ml of barium chloride solution Any turbidity produced should not be greater than the 'standard turbidity" defined in appendix 2
- 5 Heavy Metals and Iron -Dilute 10 ml with 15 ml of water, add 25 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours' defined in appendix 2
- 6 Arsenic.-Evaporate 42 ml on a water bath until reduced to 15 ml , keeping the liquid vellow by the addition, from time to time, of a

t

HYDROCHLORIC ACID (sp gr 1 18)-continued

few drops of bromine solution add 50 ml of water and a few drops of stannous chloride solution, and test as described in appendix 4. Any stain produced should not be greater than a 0 002 mg. standard stain

7 Assay.—Dilute 4 g with 50 ml of water and titrate with N/r NaOH using methyl red as indicator

1 ml N/1 NaOH = 0 03646 g HCl

Not less than 354 per cent should be indicated

ANALAR

HYDROFLUORIC ACID

(40 per cent.)

HF ≈ 20 01

Maximum Limits of Impurities

Non-volatile Matter	100	per cent
Chloride (Cl)	100 0	per cent
Sulphate (SO ₄)	0 004	per cent
Silica (SiO ₂)	02	per cent
Heavy Metals (Pb)	0 001	per eent
Iron (Fe)	2000 d	per cent

1 Description -A clear colourless liquid

2 Non-volatile Matter.—Evaporate 10 g to dryness in a platinum dish, add 1 drop of sulphuric acid and ignite gently. Not more than 1 mg of residue should be left

3 Chloride — Dilute 1 g with 50 ml of water and add 1 ml of silver nutrate solution. No onalescence should be produced

4 Sulphate.—To 5 g add 0 2 ml of N/t Na₂CO, and evaporate to dryness on a water-bath, dissolve the residue in 10 ml of water and 1 ml of N/t HCl, filter if necessary, and add 1 ml of barium chloride solution. Any turbudity produced should not be greater than the "standard

turbidity" defined in appendix z

5 Silica—Dilute 2 g with 10 ml of water in a platinum dish, add dilute ammons solution until sladine and boil off the excess, add 5 ml of a 20 per cent aqueous solution of potassium chloride and 10 ml of 90 per cent alcohol, allow to stand for 5 minutes and then transfer to a test-tube and examine immediately No turbidity should be produced

6 Heavy Metals and Iron—Dulute 2 g with 35 ml of water, add 15 ml of dulute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2

7 Assay.—Dilute 15 g with 100 ml of water and titrate with N/1 NaOH using phenol red as indicator

I ml of N/I NaOH = 0 02001 g HF

Not less than 40 per cent should be indicated

ANALAR HYDROGEN PEROXIDE

(20 volumes) 6 per cent w/v

H,O, = 34 016

Maximum Limits of Impurities

Acidity	o ml N/1 per cent
Non volatile Matter	o cos per cent
Chloride (Ci)	o coor per cent
Sulphate (SO ₄)	o oor per cent
Phosphate (PO ₄)	o coo2 per cent
Heavy Metals (Pb)	g 00004 per cent
Iron (Fe)	o cocca per cent
Barium (Ba)	o oo2 per cent
Arseruc (As ₄ O ₄)	o occor per cent
	(o I part per million)

- 1 Description -A clear colourless liquid
- 2 Solubility -Miscible in all proportions with water and with alcohol
- 3 Acidity Dilute 10 ml with 20 ml of water and titrate with Nijo NaOH using bromothymol blue as indicator. Not more than 01 ml of N/10 NaOH should be required.
- 4 Non-volatile Matter Evaporate 20 ml to dryness and ignite gently Not more than 1 mg of residue should be left
- 5 Chloride Dilute 10 ml with 40 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 6 Sulphate Dilute 10 ml with 40 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 7 Phosphate—Liaporate 5 ml to dryness d ssolve any residue in 20 ml of water add 3 ml of dilute sulphune actd 1 ml of phosphate reagent No 2 and place in a water bath at 60° for rominutes Any blue colour produced should not be deeper than the standard colour defined in appendix 2

(Cont n ed overleaf)

ANALAR STANDARDS

HYDROGEN PEROXIDE (29 tolumes) -- continued

- 8 Heavy Metals and Iron.—To 50 ml add 0 r g of sodium carbonate and evaporate to complete dryness on a water-hath Dissolve the residue in 10 ml of water and 1 ml of dilute mitric acid, dilute with 35 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2.
- 9 Barlum.—Dilute 10 ml with 40 ml of water, add 1 ml of dilute sulphuric acid and allow to stand for 1 hour No turbidity or precipitate should be produced
- to Arsenic.—To 50 ml add 01 g of sodium carbonate and evaporate to complete dryness on a water-bath Dissolve the residue in 50 ml of water and 10 ml of stannasted hydrochloric acid and test as described in appendix 4. Any stain pmduced should not be greater than a 000 mg standard stain
- 11. Assay,—Dilute 1 ml with 20 ml of water, add 10 ml of dilute sulphuric acid and titrate with N/10 KMaO4

r ml. N/ro KMnO₄ ≡ 0 0017 g H₂O₂ ≡ 0 566 volume oxygen

Not less than 6 per cent w/v (20 volumes) should be indicated

ANALAR

HYDROGEN PEROXIDE (100 volumes)

30 per cent. w/v

H₂O₂ = 34 or6

Maximum Limits of Impurities

o s ml N/1 per cent
ooi per cent
e coos per cent
o oos per cent
o ooi per cent
6 0002 per cent
e oper per cent
o or per cent
e oos per cent
o 00005 per cent
(o 5 part per million)

- I Description.—A clear colourless liquid
- 2 Solubility.—Miscible in all proportions with water and with alcohol
- 3 Acidity.-Dilute 2 ml with 20 ml of water and titrate to 2 green

129

colour with N/10 NaOH using bromothymol blue as indicator. Not more than 0.1 ml. of N/10 NaOH should be required.

4. Non-volatile Matter.—Evaporate 10 ml. to dryness and ignite gently. Not more than 1 mg. of residue should be left.

- 5-10. Tests for Chloride, Sulphate, Phosphate, Heavy Metals and Iron, Barium and Arsenic are carned out as described for hydrogen peroxide (20 volumes) using in each case one-fifth of the specified amount of the sample.
- 11. Nitrogen.—To 5 ml. add a drop of sulphure acid and evaporate on a steam bath to 2 ml. Transfer to a Kjeldhal flask with 10 ml of sulphure acid, add or 1g of sucrose and allow to stand for 30 minutes Add 005 g of cupne sulphate and 5 g. of potassium sulphate and digest until completely oxdused. Cool, dilute with water, add 60 ml. of 50 per cent sodium hydroxide solution, distil and collect the distillate m 10 ml. of N/100 H/20Q, and tutrate the excess of acid with N/100 NaOH using methyl red as indicator. Carry out a blank determination in the same manner. The difference between the two utrations should not exceed 18 ml.
- Assay.—Dilute 5 ml. with water to 500 ml. To 20 ml of this solution add 10 ml of dilute sulphune acid and titrate with N/10 KMnO₄.
 1 ml N/10 KMnO₄ ≡ 00017 g. H₂O₂

≡ 0.566 volume oxygen.

Not less than 29 per cent w/v (97 volumes) should be indicated.

ANALAR

HYDROXYLAMINE HYDROCHLORIDE

NH,OH.HC1 = 69 50

Maximum Limits of Impurities

Reaction			passes test
Sulphated Ash			o os per cent.
Sulphste (SO ₄)			o cos per cent.
Heavy Metals (Pb)			o ooz per cent.
Iron (Fe)			o oot per cent
Ammonia			no reaction

- Description.—Colourless crystals.
- 2. Solublity.—Soluble m alcohol Dissolve 5 g in 50 ml of water; a clear colourless solution should be produced.
- 3. Reaction.—Dissolve 1 g. in 50 ml. of 90 per cent. alcohol, add 3 drops of dimethyl yellow solution and titrate to the full yellow colour with N/1 NaOH. Not more than 02 ml. should be required.
- 4. Sulphated Ash.—Moisten 2 g. with sulphuric acid and ignite gently; not more than 1 mg. of residue should be left.

(Continued overleaf)

HI DROXYLAMINE HI DROCHLORIDE-cortin sed

- 5 Sulphate.—Dissolve z g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of banum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 6 Heavy Metals and Iron—Dissolve I g m 40 ml of water, add to ml of difute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined m appendix 2.
- 7 Ammonia.—Dissolve 1 g in 10 ml of water, add 5 ml of sodium hydroxide solution and boil No odour of ammonia should be perceptible
- 8 Assay —Dissolve 0 3g in water and male up to 250 ml. To 25 ml in a stoppered bottle add 50 ml of M/60 potassium bromate solution followed by 40 ml of dilute hydrochloric acid. Leave to stand for 15 minutes add 3 g of potassium iodide and utrate the liberated iodine with N/10 Na.5.0, usine starts boulton as indicator.
 - t ml M/60 kBrO2 = 0-01158 g NH,OH HCl

Not less than 98 per cent should be indicated

ANALAR

8-HYDROXYQUINOLINE

C.H.N OH = 145 15

Maximum Limits of Impurities

Sulphated Ash 0 05 per cent
Chloride (Cl) 0 0005 per cent
Sulphate (SO.) 0 01 per cent

- 1 Description -- White or cream coloured trystals or crystalline
- 2 Solubility —Soluble in alcohol and in dilute ammonia forming clear solutions One gram should desolve in 20 ml of dilute accute acid forming a clear yellow solution
 - 3 Melting Point.-74° to 76°.
- 4 Sulphated Ash Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Chloride Dissolve 2 g in 45 ml of water and 5 ml of dilute intric acid and add 1 ml of silver nitrate solution. No opalescence should be produced
- 6 Sulphate Dissolve 2 g in 45 ml of water and 5 ml of dilute hydrochloric acid add 1 ml of banum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced

7 Assay —Dissolve o 15 g in 50 ml of water and 20 ml of diluter hydrochloric acid in a stoppered bottle Add 1 drop of a 1 per cent aqueous solution of indigo camine and titrate with N/10 bromide-bromate solution, with vigorous shaking, until almost all trace of green colour has disappeared Stopper and silow to stand for 5 minutes Add 80 ml of water and 10 ml of potassium todide solution and titrate with N/10 Na₂O₂0, using starch solution as indicator

1 ml N/10 bromide bromate = 0 003629 g C_pH_bN OH Not less than 99 5 per cent should be indicated

ANALAR INDIGO CARMINE

 $C_{14}H_4O_4N_2S_2Na_2 = 466 37$

Maximum Limits of Impurities

- 1 Description —A deep blue powder or blue granules with a coppery lustre
- 2 Solubility—Readily soluble in warm water forming a deep blue solution. Almost insoluble in alcohol. Dissolve 1 g in 100 ml of hot water. Filter through a Gooch crucible wash with hot water, dry at 100° and weigh. Not more than 2 mg of residue should be obtained.
- 3 Reaction—Dissolve I g in 20 ml of hot water add 5 g of sodium chloride, shake, cool, filter and didute 10 ml of the filtrate with 10 ml of water. This solution should be neutral to methyl red or should require not more than 0 i ml of N/10 HCl or N/10 NaOH to render it so
- 4 Sulphated Ash —Mousten 0.5 g of the dried material from Test No.5 with sulphune acid and ignite The residue should not be greater than 3.5 per cent and not less than 3.0 per cent
- 5 Moisture —Dry 2 g at 100° for one hour 'The loss in weight should not be greater than 200 mg
- 6 Assay —Dissolve 0.5 g of the dried material from Test No. 5 in 150 ml of water and add 1.5 g of sodium hydrogen tartrate. Boil and titrate the hot solution, slowly with shaking, with N/10 TiCl₃ in an inert atmosphere until the deep hlue colour changes to red brown

1 ml N/10 T1Cl3 = 0.02332 g $C_{16}H_8O_6N_2S_2Na_7$

Not less than 90 per cent should be indicated

ANALAR IODIC ACID

HIO, = 175 03

Maximum Limits of Impurities

Iodide Sulphated Ash Sulphate (SO.) no reaction o of per cent o of per cent

- Description —White crystals or crystalline powder
- 2 Solubility (Iodide) -- Dissolve 2 g in 20 ml of water A clear colourless solution should be produced
- 3 Sulphated Ash —Moisten 2 g with sulphuric acid and ignite gently Not more than 1 mg of residue should be left
- 4 Sulphate —Dissolve 1g in 50 ml of water add 1 g of hydroxyl amme hydrochloride and boil until free voltne 1s removed cool dilute to 50 ml, add 0 5 ml of dilute hydrochloric send and 1 ml of barum chloride solution and allow to stand for 15 minutes No turbulty or precipitate should be produced.
- 5 Assay Dissolve o 1 g in 50 ml of water add 3 g of potassium iodide and 10 ml of dilute hydrochlone acid and titrate the liberated iodine with N/10 Na.5.0.

1 ml N/10 N22S2O2 = 0002932 g HIO2

Not less than og per cent should be indicated

ANALAR IODINE

I = 126 92

Maximum Limits of Impurities

- Description —Bluish black crystalline scales with a metallic lustre
 Solubility.—Almost insoluble in water Dissolve 2 5 g in 25 ml
- 2 Solubility.—Almost insoluble in water Dissolution 2.5 g in 3.5 in of potassium jodide solution and add this to a solution of 5 g of solution thiosulphate in 75 ml of water a clear colourless solution should be produced

- 3 Non-volatile Matter.—Ignite 10 g gently, not more than 1 mg of residue should be left
- 4. Chloride and Bromide—"Inturate 5 g of the powdered material with 2g ml of water, allow to stand for 30 minutes and filter. Shake 10 ml of the filtrate with a little zine filings until colourless, filter, add 1 ml of dilute ammonia solution and 1 ml of silver nitrate solution, again filter and to the clear filtrate add 40 ml of water and 2 ml of dilute nitric acid. Any opalescence produced should not be greater than the standard opalescence 'defined in appendix 2.
- 5 Cyanide.—Decolorise to ml of the aqueous extract from Test No 4 with N/to Na₂S₂O₃ add 1 drop of ammonium sulphide solution and evaporate on a water bath until the yellow colour is discharged, cool and add 0 2 ml of dilute hydrochloric acid and 1 drop of ferric chloride solution. No pink colour should be produced
- 6 Sulphate—Digest 1 g of the powdered material with 1 g of zine powder and 5 ml of water until reduced add 1 ml of dilute hydrochloric and and 45 ml of barre filter add 1 ml of barrum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced

ANALAR

IODINE PENTOXIDE

 $I_2O_6 = 333.84$

Maximum Limits of Impurities

Iodide no reaction
Sulphated Ash o 2 per cent
Suitability for Gas Analysis passes test

- 1 Description --White or slightly tinted granules free from the odour of chlorine
- 2 Solubility (Iodide) —Dissolve I g in 20 ml of water A colour less solution which is not more than slightly hazy should be produced
- 3 Sulphated Ash.—Woisten 1 g with sulphuric acid and ignite gently. Not more than 2 mg of residue should be left
- 4 Suitability for Gas Analysis.—Heat 10 g to 200° in a U tube contained in an oil bath and yass t litre of dry air through the U tube during i hour Lead the issuing gases through a 10 per cent solution of potassium iodide, acidified with a few drops of hydrochlone acid and containing a few ml of starch solution. No blue colour should be produced.
- 5 Assay.—Treat o 15 g with 10 ml of potassium iodide solution and 20 ml of dilute hydrochloric acid Titrate the liberated iodine with N/10 Na.S.O.

1 ml N/10 Na2S2O3 = 0 002782 g I2O4

Not less than 98 per cent should be indicated

ANALAR IODINE TRICHLORIDE

ICl₃ = 233 29

Maximum Limit of Impurity

Non volatile Matter

o r per cent

- I Description—Orange red eristalline masses with pungent irritating fumes
- 2 Solubility -Dissolve 0.5 g in 50 ml of acetic acid. A clear orange yellow solution should be obtained
- 3 Non-volatile Matter—Ignite i g gently in a silica crucible Not more than i mg of residue should be left
- 4 Assay Dissolve 0.2 g in 25 ml of water containing 1 g of potassium indide, add 5 ml of dilute accure acid and titrate with N/10 Na₂S₂O₃ using starch solution as indicator

 $_1$ ml N/10 Na₂S₂O₃ \equiv 0 00₃832 $_{\rm H}$ ICl₃

Not less than 197 per cent should be indicated

AnalaR 7-1000-8-HYDROXYQUINOLINE-

5-SULPHONIC ACID
(Ferron)

C(OH) CI CH C(SO,H) C C N CH CH CH - 151 13

Maxmum Limit of Impurity

Sulphated Ash o t per cent

Sensitivity to Iron (Fe) 1 in 5 000 000 minumum

Description —A yellow crystalline powder

2 Solubility —Dissolve 0.2 g in 50 ml of hot water A clear orange yellow solution should be produced

3 Sulphated Ash—Moisten 1 g with sulphune acid in a silica crucible and ignite gently. Not more than 1 mg of residue should be left

4 Sensitivity—Add o 2 ml of a o 2 per cent aqueous solution to a maxture of 50 ml of water 1 ml of standard iron solution (1 ml == 001 mg Fe) and 0 7 ml of Niol The colour produced within 5 minutes should be definitely green when compared with a solution containing 50 ml of water, 0 5 ml of Niol HCl and 0 2 ml of the 0 2 per cent reagent solution

ANALAR ISATIN

C.H. NH CO CO = 147 13

Maximum Limit of Impurity

Sulphated Ash

o os per cent

- r Description -Yellow red or brick red crystals or powder
- 2 Solubility —Slightly soluble in cold water More soluble in hot water forming a clear orange red solution Dissolve r g in 50 ml of 90 per cent alcohol A clear red solution should be obtained
 - 3 Melting Point -- 200° to 203°

Sulphated Ash

4 Sulphated Ash -- Moisten 2 g with sulphune acid and ignite gently. Not more than 1 mg of residue should be left

ANALAR LACTIC ACID

 $CH_1 CHOH COOH = 90 08$

Maximum Limits of Impurities

Chlonde (CI)	o-cor per cent
Sulphate (SO ₄)	o or per cent
Heavy Metals (Pb)	0 0004 per cent
Iron (Fe)	o oooz per cent
Arsenie (As ₂ O ₂)	o occos per cent
	(o 2 part per million)

Reducing Sugars no reaction

- t Description.—A clear syrupy liquid almost colourless and odour less Twelve to 15 per cent of the acid is normally present in the form of anhydrides
- 2 Solubility —Miscible in all proportions with water and with alcohol forming clear colourless solutions
- 3 Sulphated Ash—To so g add 2 drops of sulphurse acid and ignite gently Not more than 2 mg of residue should be left
- 4 Chloride.—Dissolve 1 ral in 50 ml of water and add 1 ml of dilute nature and and 1 ml of silver natrate solution. No opalescence should be produced.

(Continued overleaf)

LACTIC ACID-continued

- 5 Sulphate —Dissolve 1 ml m 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of bartum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 5 g in 35 ml of water, add 15 ml of dilute ammona solution and pass by drogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Arsenic Dissolve 10 g in 50 ml of water, add 10 ml of stannated hydrochloric and and test as described in appendix 4. Any stain produced should not be greater than 3 0 002 mg standard stain.
- 8 Reducing Sugars—Descohe 1 ml in 10 ml of water, add 3 ml of sodium hydroxide solution and 5 ml of Fehing's solution and heat in a boiling water bath for 5 minutes. No red precipitate should be produced
- 9 Assay —Dilute 4 g with 100 ml of water add 50 ml of N/1 NaOH boil gently for 5 minutes, cool and titrate with N/1 HCl using phenolphthalein as indicator

r ml N/t NaOH = 0 09008 g CH₃ CHOH COOH Not less than the equivalent of 88 per cent should be indicated

ANALAR LACTOSE

C1.H1.O1, H.O = 360 31

-11-11-11-1

Maximum Limits of Impurities

Alcohol soluble Impuntees per cent osm! N/I per cent " Acidity Sulphated Ash 0 05 per cent Formaldehyde no reaction 0 05 per cent Protein (N) Heavy Metals (Pb) o ooo4 per cent Iron (Fe) o coo2 per cent per cent Moisture

- I Description —A white crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of hot water A clear colour less solution should be produced
- 3 Alcohol-soluble Impursties—Shake occasionally 5 g with 20 ml of 90 per cent alcohol during 30 minutes filter, evaporate 10 ml of the filtrate, dry at 100° and weigh the residue 17 om the weight obtained deduct 2 5 mg. The difference should not exceed 2 5 mg.
- 4 Acidity —Dissolve 10 g in 100 ml of hot carbon dioxide free water and titrate with N/10 NaOH using phenolphihalein as indicator Not more than 0 5 ml. of N/10 NaOH should be required

- 5 Specific Rotation -[a]20 +500 to +52 60 determined on a 10 per cent w/v well boiled aqueous solution
- 6 Sulphated Ash -- Moisten 10 g with sulphuric acid and ignite gently, again moisten with sulphuric acid and ignite. Not more than me of residue should be left
- 7 Formaldehyde. Dissolve 1 g in 10 ml of water and add 1 ml of Schiff's reagent. No violet colour should be produced
- 8 Protein -Digest 1 g with 20 ml of sulphuric acid and 0 05 g of cupric sulphate until completely oxidised Cool dilute with water render alkaline with sod um hydroxide distil and collect the distillate in 10 ml of N/100 H2SO4 and titrate the excess of acid with N/100 NaOH using methyl red as indicator Carry out a blank determination in the same manner. The difference between the two titrations should not exceed 3 6 ml
- 9 Heavy Metals and Iron -- Dissolve 5 g in 45 ml of water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be greater than the standard colours defined in appendix 2
- 10 Moisture -Dry 5 g at 100° for 1 hour The loss in weight should not exceed 20 mg

ANALAR LEAD

Pb = 207 21

Maximum Limits of Impurities

Silver (Ag) o booos per cent Copper (Cu) 1000 per cent Iron (Fe) 0 001 per cent Total Foreign Metals (as sulphates) per cent Arsenic (As₂O₃) o coor per cent (x part per mullion)

I Description -A blush grey soft metal

- 2 Silver Dissolve 20 g in 70 ml of dilute native acid by the aid of gentle heat aidd 20 ml of water and 10 ml of sulphuric acid allow to stand for 5 minutes and filter Evaporate the filtrate until white fumes are evolved cool add 5 ml of water and again evaporate until white fumes are evolved cool add 100 ml of water and 100 ml of alcohol allow to stand for 2 hours and filter Remove the alcohol from the filtrate by evaporation dilute to 100 ml with water and add 1 ml of dilute hydro chloric acid No opalescence should be produced
- 3 Copper -To 5 ml of the solution from the preceding test add 10 ml of water to ml of ammonium acetate solution 3 drops of pyridine

LEAD-continued

I ml of ammonium thiocyanate solution and 2 ml of chloroform, shake vigorously and allow to separate. Any colour produced in the chloroformic layer should not exceed that given by I ml of standard copper solution (I ml \equiv 0 or I mg Ca) in 12 ml of water and z ml of dilute accuse acad with the quantities of reagents used in the test and treated in the same manner.

- 4 Iron —To 5 ml of the solution from Test No 2 add 5 ml of water, t ml of dilute hydrochloric and and t drop of N₁ to kNmO₄, max add 5 ml of attructonium thiocyanate solution and to ml of a muture of equal volumes of amyl alcohol and amyl acetate shake vigorously and allow to separate Any colour produced in the upper layer should not be greate than that produced by treating 1 ml of standard from solution (t ml = 0 ot mg Fe) in the same manner.
- 5 Total Foreign Metals.—Evaporate to dryness 50 ml of the solution from Test No 2 and ignite gently Not more than 2 mg of residue should be obtained
- 6 Arsenic —To 25 ml of the solution from Test No 2 add 25 ml of water and 10 ml of stannated hydrochloric and and test as desenbed in appendix 4. Any stain produced should not be greater than a 0.005 mg standard stan.

ANALAR

LEAD ACETATE

 $(CH_4 COO)_4 Pb _3 H_4 O = 379 35$

Maximum Limits of Impurities

Chloride (Cl)	o oo1 per cent
Nitrate (NO ₄)	0 002 per cent
Copper (Cu)	o oor per cent
Iron (Fe)	o cos per cent
Alkalıs (Na)	o ors per cent

- Description -- White or colourless crystals or crystalline masses
- 2 Solubility —Dissolve 5 g m 50 ml of carbon dioxide free water A colourless solution is produced which is not more than slightly opales cent and becomes clear on the addition of a few drops of acetic acid
- 3 Chloride—Dissolve I g in 50 ml of water and add I ml of dilute nitric acid and I ml of silver nitrate solution No opalescence should be produced
- 4 Nitrate —Dissolve 1 g m 10 mil of water, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Copper Dissolve 1 g m 15 ml of water, add 5 ml of ammonium acetate solution, 2 ml of acetae and 3 drops of pyridine, 1 ml of

ammonium thiocyanate solution and z ml of chloroform, shake vigorously and allow to separate. Any colour produced in the chloroformuc layer should not exceed that given by z ml of standard copper solution (z ml = 0 o I mg Cu) in 15 ml of water with the quantities of reagents used in the test and treated in the same manner.

- 6 Iron—Dissolve 1 g in 5 ml of water, add 3 ml of didute sulphune acid and filter, to 4 ml of the filtrate add 5 ml of water, 1 ml of didute hydrochloric acid and 1 drop of N/for KMnO4, mix, add 5 ml of ammonium thioevanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acctate, shake vigorously and allow to separate. Any colour produced in the upper laver should not be greater than that produced by treating 0.5 ml of standard iron solution (1 ml \Longrightarrow 00 mg. Fe) in the same manner
- 7 Alkalis.—Dissolve to g in 200 ml of water, add 20 ml of dilute hydrochloric acid and filter, remove the remander of the lead by means of hydrogen sulphinde, filter, evaporate the filtrate to dryness, add t drop of sulphuric acid and ignite gently. Not more than 5 mg of sesidue should be obtained.
- 8 Assay Dissolve of g in 50 ml of water, add a few drops of actin each, eat nearly to boiling and precipitate the lead with 1 g of oxalic acid. Cool filter, wash the precipitate free from soluble oxalate, suspend it in 50 ml of water, add 5 ml of dilute sulphuric acid warm to 60° and utrate with N/10 KMnO.

1 ml N/10 KMnO4 = 0 01896 g (CH2 COO)2Pb 3H2O

Not less than 99 5 per cent and not more than 103 per cent should be indicated

ANALAR

LEAD ACETATE (BASIC)

Approxumate formula (CH₃ COO)₂Pb Pb(OH)₃ = 5665

Maximum Limits of Impurities

Nitrate (NO₂) . , 0 002 per cent
Copper (Cu) 0 002 per cent
Iron (Fe) 0 004 per cent

- 1. Description -A heavy white powder
- 2. Solubility.—Slowly soluble in water forming a hazy alkaline solution
- 3 Nitrate—Dissolve i g in so ml of water add i ml of standard indigo solution and io ml of sulphuric acid and heat to boiling. The blue colour should not entitlely disappear.
- 4 Copper.—Dissolve o 5 g m 15 ml of water, add 5 ml of ammonium acetate solution, 2 ml of dulute acetic acid, 3 drops of pyridine, t ml of ammonium thiocyanate solution and 2 ml of chloroform, shake vigorously and allow to separate. Any colour produced in the chloroformic

LEAD ACETATE (BASIC) -continued

layer should not exceed that given by I ml of standard copper solution (1 ml = 0 or mg Cu) in 15 ml of water with the quantities of reagents used in the test and treated in the same manner

- 5 Iron —Dissolve 0.5 g in 5 ml of water, add 3 ml of dilute sulphurie acid and filter, to 4 ml of the filtrate add 5 ml of water, 1 ml of dilute hydrochloric acid and I drop of N/10 KMnO., mix, add 5 ml of ammonium theocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, ahake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 of mg Fe) in the same manner
- 6 Assay -(a) Dissolve 0 5 g in 50 ml of water, add 2 ml of dilute acetic acid, heat nearly to boiling and precipitate the lead with 1 g of oxalic acid Cool, filter, wash the precipitate free from soluble oxalate, suspend it in 50 ml of water add 5 ml of dilute sulphuric acid warm to 60° and titrate with N/10 KMnO.
 - 1 ml N/10 KMnO, = 0 01416 g (CH, COO), Pb Pb(OH),

Not less than 98 per cent should be indicated (b) Dissolve 5 g in 100 ml of water, add 50 ml of N/1 H.SO. and sufficient water to produce 200 ml Shake, allow to settle decant 100 ml of the clear liquid and titrate the excess of acid with N/1 NaOH using phenolphtbalein as indicator

1 ml N/1 H₄SO₄ = 0 2833 g (CH₂ COO)₂Pb Pb(OH)₂ Not less than 93 per cent should be indicated

ΔΝΑΙΑΚ LEAD DIOXIDE

PbO. = 239 22

Maximum Limits of Impurities

Water soluble Matter per cent o oos per cent Chloride (CI) 0 01 per cent Sulphate (SO4) passes test Carbonate Manganese (Mn) o coos per cent

1 Description —A dark brown or nearly black amorphous powder 2 Water-soluble Matter -Boil 2 g with 50 ml of water, filter,

evaporate the filtrate to dryness on a water-bath and weigh the residue Not more than 2 mg should be obtained

3 Chloride -Warm 2 g with 10 ml of dilute nitric acid 30 ml of water and 6 ml of hydrogen peroxide (20 volumes) until solution is complete Cool and add I ml of silver natrate solution Any opalescence produced should not be greater than the standard opalescence' defined in appendix 2

- 4 Sulphate.—Boil 1 g with 50 ml of water and 10 ml of ammonium acetate solution, cool, filter and to the filtrate add 1 ml of dulute acetic acid and 1 ml. of banum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- garbonate —Moisten 5 g on a watch glass with 5 ml of water, add 5 ml of intine acid and stir with a platinum wire. No evolution of gas should be perceptible
- 6 Manganese—Boll 2 g with 5 ml of nitric acid and 1 ml of water, cool add 15 ml of water and 5 ml of dilute sulphuric acid and allow the precipitate to settle. The supernatant liquid should not be coloured pink
- 7 Assay. Shake 0 5 g with 1 g of potas num iodide, 25 g of sodium chloride, 100 ml of water and 20 ml of hydrochloric acid until dissolved, and titrate the liberated iodine with N/10 Na₂O₂O₃ using starch as indicator

1 ml N/10 Na2S2O2 = 0 01196 g PhO2

Not less than 95 per cent should be indicated

ANALAR

LEAD NITRATE

Pb(NO₂)₂ = 331 23

Maximum Limits of Impurities

Chloride (Cl) 0 01 per cent
Copper (Cu) 0 001 per cent
Iron (Fe) 0 001 per cent
Alkalis and other Metals (Na) 0 03 per cent

- I Description -White crystals or a crystalline powder
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colouriess solution should be produced
- 3 Chloride —Dissolve i g in 50 ml of water and add i ml of dilute nitric acid and i ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
 - 4 Copper.—Dassove a g m as mi of lant water, add 5 ml of ammonium acetate solution and 2 ml of dilute aceta ead, cool and add 3 drops of pyndine, 1 ml of ammonium thoeyanate solution and 2 ml of chloroform, ahake rigorously and allow to separate. Any colour produced in the chloroformic layer about not exceed that given by 1 ml of standard copper solution (1 ml = 001 mg Cu) in 25 ml of water with the quantities of reggents used in the test and treated in the same manner.
 - 5 iron—Dissolve 1 g in 5 ml of water, add 3 ml of dilute sulphuric acid and filter, to 4 ml of the filtrate add 5 ml of water, 1 ml of dilute hydrochloric acid and 1 drop of N/10 KNinO4, mix, add 5 ml of

I.F.AD NITRATE-continued

ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 0 5 ml of standard iron solution (1 ml = 0 or mg Fe) in the same manner

6 Alkalis and other Metals —Dissolve 5 g in 100 ml of water, add 2 g of ammonium acetate and 5 ml of dilute acetic acid and remove the lead by means of hydrogen sulphide, filter, evaporate the filtrate to dryness, add 2 drops of sulphuric acid and sgnite gently. Not more than 5 mg of residue should be obtained.

ANALAR

PbO = 223 21

Maximum Limits of Impurities

Acetic Acid insoluble Matter	10	per cent
Chloride (Cl)	0 005	per cent
Nitrate (NO ₃)	0 002	per cent
Silver (Ag)	0 00005	per cent
Copper (Cu)	0 001	per cent
Iron (Fe)	0 0025	per cent
Total Foreign Metals (as sulphates)	0.25	per cent
Loss on Ignition	0.4	per cent

- I Description -A heavy sellow or orange coloured powder
- 2 Acetic Acid-insoluble Matter.—Dissolve 10 g in 25 ml of hot dilute acetic acid and 25 ml of water, filter, wash the filter with water until free from acid, and dry Not more than 10 mg of residue should be obtained.
- 3 Chloride Dissolve 2 g in 5 ml of dilute mitric atrid and 45 ml of water and add 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 4 Nitrate —Dissolve 1 g m 3 ml of dilute acetic acid and 5 ml of water add 2 ml of dilute sulphunc acid o 2 g of oralic acid boil cool, add 1 ml of standard indigo solution and 10 ml of sulphunc acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Silver—Dissolve 20 g m 50 ml of hot dilute nitric acid and 40 ml of water add to ml of sulphunc acid diluted with 10 ml of water, allow to stand for 5 minutes and filter Exporte the filtrate until white fumes are evolved, cool add 5 ml of water and again evaporate until white fumes are evolved, cool add 100 ml of water and 100 ml of alcohol, allow to stand for 2 hours and filter Remove the alcohol from the filtrate

by evaporation dilute to 100 ml with water and add t ml of dilute hydrochloric acid. No opalescence should be produced

- 6 Copper.—To 5 ml of the solution from the preceding test add to ml of water, 10 ml of ammonaum acetate solution 3 forps of pyridine, 1 ml of ammonaum thoughout and 2 ml of chloroform, shake vigorously and allow to separate. Any colour produced in the chloroforme layer should not exceed that given by 1 ml of standard copper solution (1 ml = 0 or 1 mg Cu) m 12 ml of water and 2 ml of dilute acetic acid with the quantities of reagents used in the test and treated in the same manner
- 7 iron.—To 2 ml of the solution from Test No 5 add 8 ml of water, 1 ml of dilute hydrochloric acid and 1 drop of N/Iv KMnO₄, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 00 im g Fe) in the same manner.
- 8 Total Foreign Matter Evaporate to dryness 50 ml of the solution from Test No 5 ignite gently and weigh the residue Not more than 25 mg should be obtained
- g Loss on Ignition —Gently ignite 5 g in a porcelain crucible. The loss in weight should not exceed 20 ing

ANALAR LITHIUM SULPHATE

L1.SO, H.O = 127 06

Maximum Limits of Impurities

Reaction	pH 6 5 to 7 5
Chloride (CI)	0 002 per cent
Nitrate (NOs)	0 002 per cent
Heavy Metals (Pb)	o cor per cent
Iron (Fe)	o ooos per cent
Loss on drying	14 0 to 15 5 per cent

- Description -White crystals or crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Reaction—Dissolve r g 10 to ml of carbon dioxide free water The pH of the solution should be between the limits of 6 5 to 7 5 using bromothymol blue as indicator
- 4 Chloride —Dissolve 5 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nutrate solution. Any opalescence produced should not be greater than the standard opalescence defined in appendix 2

LITHIUM SULPHATE-continued

- 5 Nitrate—Dissolve I g in 10 ml of water add I ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Heavy Metals and Iron—Dissolve 2 g in 45 ml of water add 5 ml of dilute ammona solution and pass hydrogen sulplinde through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 7 Loss on Drying —Dry 1 g at 150° to constant weight I'he loss in weight should not be less than 0 140 g and not more than 0 155 g

ANALAR MAGNESIUM ACETATE

(CH₅ COO)₂Mg ₄H₂O = 214 47

(CI1, COO)2/11g 41140 = 214 47

Maximum Limits of Impurities Chloride (CI) 9 001 per cent

Sulphate (SO ₄)	oor per eent
Lead (Pb)	o oor per cent
Iron (Fe)	0 0005 per cent
Zinc (Zn)	0 000 per cent
Sodium (Na)	0 006 per cent

- t Description -Colourless crystals
- z Solubility Readily soluble in alcohol Dissolve 5 g in 50 ml of water a clear colourless solution should be produced
- 3 Chloride—Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 4 Sulphrate—Dissolve 1 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbulty or preopitate should be produced
- 5 Lead —Dissolve 7 g in 25 ml of water and 5 ml of dilute ammonia solution and 1 ml of potassium cyanide solution dilute with water to 5 ml and add 2 drops of sodium sulphide solution. Any brown colour produced should not be greater than that produced by the add to not 2 drops of sod um sulphide solution to 50 ml of solution containing 2 g of the sample 5 ml of dilute accetic acid 10 ml of cilities and of the solution in 1 ml of potassium cyanide solution and 5 ml of standard lead solution (1 ml = 00 mg Pb)
- 6 Iron —D ssolve 2 g in 7 ml of water and add 4 ml of dilute hydrochloric acid and 1 drop of N/Io KhInO, mix add 5 ml of ammonium thooyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate shake vigorously and allow to esparate Any colour produced in the upper layer should not be greater than that

produced by treating r ml of standard iron solution (r ml \Rightarrow 0-01 mg. Fe) in the same manner

- 7 Zinc Dissolve 5 g in 40 ml of water and add 10 ml of dilute hydrochloric acid and 1 ml of potassium ferrocyanide solution and allow to stand for 10 minutes. No turbidity should be produced
- 8 Sodium —Dissolve 25 g in 3 ml of uranium acetate solution* and 7 ml of water add 10 ml of alcohol and allow to stand for 1 hour No turbidity or precipitate should be produced
- 9 Assay —Ignite 3 g gently until completely decomposed boil the residue with 100 ml of water and 50 ml of N/1 H, SO, for 10 minutes filter and wash with water Thrate the filtrate and washings with N/1 NaOH using methyl red as indicator

t ml N/t $H_2SO_4 \equiv 0$ 1073 g (CH₃ COO)₂Mg $_4H_2O$

Not less than 99 per cent should be indicated

ANALAR

MAGNESIUM AMMONIUM CHLORIDE

MgCl, NH,Cl 6H,O = 256 B3

Maximum Limits of Impurities

i ree Acid	0 i ml N/i per cent
Free Alkalı	o i ml N/i per cent
Sulphate (SO _d)	0 01 per cent
Phosphate (PO ₄)	D 002 per cent
Heavy Metals (Pb)	G GOI per cent
Iron (Fe)	o poos per cent
Barium (Ba)	0 002 per cent
Calcium (Ca)	o cos per cent
Arsenic (As ₂ O ₃)	o ooo5 per cent
	(5 parts per mill on)

- 1 Description —White crystals
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colouriess solution should be produced.
- 3 Reaction.—Dissolve to g in roo ml of carbon dioxide free water The solution should be neutral to bromothymol blue or should not require more than o i ml of N/io NaOH or N/io HCl to render it so
- 4 Sulphate.—Dissolve 1 g in 50 ml of water add 1 ml of dilute hydrochlone acid and 1 ml of barnum chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced
- *D stolve or5 g of transl acetate. AnalaR in 10 ml of water heat to boling and add 15 ml of d lute ammonts solution. Filter wash the precipitate with hot water and d stolve in 3 ml of dilute sector and

MAGNESIUM AWMONIUM CHLORIDE—conts med

- 5 Phosphate.—Dissolve 5 g in 50 ml of water and add r ml of dilute ammonia solution. No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2.
- 7 Barlum.—Dissolve 1 g in 50 ml of water, add 1 ml of dilute sulphuric acid and allow to stand for 6 hours No turbidity or precipitate should be produced
- 8 Calcium.—Dissolve 1 g in 20 ml of water and add r ml. of ammonium oxalate solution No turbidity or precipitate should be produced
- 9 Arsenic —Dissolve 2 g in 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than 2 0 0x mg standard stain
- to Assay—(a) Dissolve 0.4 g in 50 rol of water, add 5 ml of nitne acid and 50 ml of N/10 AgNO₃ filter, wash with water and titrate the filtrate and washings with N/10 NH₄SCN using ferric ammonium sul phate as indicator

 $t ml N/to AgNO_3 \equiv 0 co856t g MgCl_2 NH_4Cl 6H_2O$

Not less than 96 per cent should be indicated

(b) Dissolve I g in 150 ml of water, add I ml of dilute hydrochlone acid, 5 g of ammonium acetate and 10 ml of ammonium phosphate solution. Heat to boiling, add a few drops of phenolphthalein solution, render slightly alkaline with dilute ammonia solution and str until a precipitate separates. Cool., add 25 ml of dilute ammonia solution and allow to stand overnight. Filter off the precipitate in a Gooch crucible, wash with diluted ammonium until free from chlonde, add a crystal of ammonium intrate, dry, ignate and weigh the resulting Mg₁P₂O₂.

Weight of $Mg_1P_2O_7 \times 2$ 3075 = weight of $MgCl_2.NH_4Cl$ $6H_2O$ Not less than 96 per cent should be indicated

ANALAR MAGNESIUM CHLORIDE

MgCl, 6H, 0 = 203 33

Maximum Limits of Impurities

Alcohol insoluble Matter nd Free Acid o os mi N/1 per cent Free Alkalı o os ml N/I per cent Sulphate (SO₄) e cos per cent Phosphate (PO₄) o ooos per cent Heavy Metals (Pb) o oos per cent Iron (Fe)

o coos per cent Barrum (Ba) o or per cent Calcium (Ca) noos per cent Arsenic (As₂O₂) o coos per cent

(s parts per million)

z Description —Colourless deliquescent crystals

- 2 Solubility -- Completely soluble in 6 times its weight of go per cent alcohol Dissolve 5 g in 50 ml of water a clear colourless solution should be produced 3 Reaction - Dissolve to g in 100 ml of carbon dioxide free water
- The solution should be neutral to bromothymol blue or should not require more than o of ml of N/10 NaOH or N/10 HCl to render it so Sulphate - Dissolve 2 g in 50 ml of water add 1 ml of dilute
- hydrochloric acid and 1 ml of barium chloride solution and allow to stand for a hour. No turbidity or precipitate should be produced
- 5 Phosphate Dissolve 2 g in 20 ml of water add 3 ml of dilute sulphuric acid 1 ml of phosphate reagent to 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any colour produced should not be deeper than the standard colour de fined in appendix 2
- 6 Heavy Metals and Iron -Dissolve 2 g in 40 ml of water add 5 ml of ammonium chloride solution and 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the standard colours defined in appendix 2
- 7 Barium -Dissolve 2 g in 50 ml of water add 1 ml of dilute sulphuric acid and allow to stand for 6 hours. No turbidity or precipitate should be produced
- 8 Calcium Dissolve 2 g in 50 ml of water add 5 ml of ammonium chloride solution 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced

(Continued overleaf)

MAGNESIUM CHLORIDE-continued

- 9 Arsenic —Dissolve 2 g in 50 ml of water add 10 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than a 0 01 mg standard stain
- 10 Assay Dissolve 0.4 g in 50 ml of water add 10 ml of dilute natric acid and 50 ml of N/10 AgNO2 filter wash with water and titrate the filtrate and washings with N/10 NH, SCN using ferric ammonium sulphate as indicator

1 ml N/10 AgNO_a = 0 01016 g MgCl₂ 6H₂O

Not less than 98 per cent should be indicated

ANALAR MAGNESIUM OXIDE

MgO = 40 12

Maximum Limits of Impurities

Chloride (Ci)	O of per cent
Sulphate (SO ₄)	oor pur cent
Nitrate (NOs)	0 005 per cent
Heavy Metals (Pb)	o ooz per cent
Iron (Fe)	0 or per cent
Arsenic (As ₂ O ₂)	o cool per cent
	(1 part per million)
Loss on Ignition	50 per cent

1 Description -A white powder

- 2 Solubility —Almost insoluble in water Dissolve 2 g in 20 ml of dilute hydrochloric acid and 30 ml of water a clear solution should be produced
- 3 Chloride—Dissolve 1 g in 15 ml of dilute nitric acid cool add 35 ml of water and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 4 Sulphate —Dissolve 1 g m 15 ml of dilute hydrochloric acid, add 35 ml of water and 5 ml of barnum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 5 Nitrate—Desoive 0.4 g in 12 ml of dilute sulphune acid, add i ml of standard indigo solution and 12 ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear
- 6 Heavy Metals Dissolve 0.25 g in 5 ml of dilute accur and 45 ml of water and pass hydrogen sulphide through the solution for a few seconds. No darkening in colour should be observed.
- 7 Iron —Dissolve o 1 g in 2 ml. of dilute hydrochloric acid and 8 ml of water and add 1 drop of N/to kMnO₄ mix add 5 ml of ammanium thiocyanate solution and 10 ml of a mixture of equal volumes

of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 001 mg Fe) in the same manner

8 Arsenic.—Dissolve 5 g in 35 ml of brominated hydrochloric acid and 35 ml of water, add a few drops of stannous chloride solution and test as described in appendix 4 Any stain produced should not be greater than a 0 00, mg standard stain

g Loss on Ignition - Heat I g to dull redness The loss in weight should not exceed so me

ANALAR

MAGNESIUM SULPHATE

MgSO, 7H,O = 246 50

Maximum Limits of Impurities

Free Acid	o os ml N/1 per cent
Free Alkalı	o og ml N/s per cent
Chloride (Cl)	o cooz per cent
Phosphate (PO ₄)	o coos per cent
Heavy Metals (Pb)	o coos per cent
Imn (Fe)	o coor per cent
Zinc (Zn)	o coos per cent
Arsenic (As.O.)	o oooi per cent
	(1 part per million)

- 1 Description -Colourless free running crystals
- z Solubility -Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction -- Dissolve to g in 100 ml of carbon dioxide free water. The solution should be neutral to bromothymol blue or should not require more than 0.05 ml of N/10 NaOH or N/10 HCl to render
- 4 Chloride—Dissolve 5 g in 50 ml of water and add x ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 5 Phosphate—Dissolve 2g in 20 ml of water add 3 ml of dilute sulphuric acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour de fined in appendix 2.
- 6 Lead.—Dissolve 12 g in 30 ml of water add 5 ml of dilute acetic acid 8 ml of dilute ammonia solution and 1 ml of potassium (Continued oxerlea!)

MAGNESIUM SULPHATE-continued

cyanide solution, dilute with water to 50 ml and add 2 drops of sodium sulphide solution. Any colour produced should not be deeper than that given by the addition of 2 drops of sodium sulphide solution to 50 ml. of a solution containing 2 g of the sample, 5 ml of dilute acetic acid. S ml of dilute ammonia solution τ ml of possisium cyanide solution and 5 ml of standard lead solution (τ ml = τ o o τ mg Pb)

- 7 Iron —Dassolve 5 g in 10 ml of water and add r ml of dulute hydrochione acid and r drop of Nfro KMnO₄ mix, add 5 ml of ammonium thiocyanate solution and 10 ml. of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than produced by treating 0 5 ml of standard iron solution (i ml = 001 mg Fe) in the same manner
- 8 Zinc.—Dissolve 5 g in 50 ml of water and add r ml of dilute hydrochlone acid and r ml of potassium ferrocyanide solution. No opplescence should be produced.
- 9 Arsenic.—Dissolve 10 g in 50 ml of water, 2dd 10 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than a 0 01 mg standard stain

ANALAR

MANGANESE CHLORIDE

 $MnCl_{1-1}H_{2}O = 19791$

Maximum Limits of Impurities

Sulphate (SO ₄)	0 005	per cent
Heavy Metals (Pb)	0 001	per cent
Iron (Fe)	0 001	per cent
Nickel (Ni)	1000	per cent
Zinc (Zn)	0 05	per cent
Barrum (Ba)	0 02	per cent
Calcium (Ca)	0 52	per cent
Magnesium and Alkalis (as sulphates)	O I	per cent
Oxidising and Reducing Substances	passes	test

- I Description.—Pink crystals
- 2 Solubility—Dissolve 5 g in 50 ml of water A clear faintly pink solution should be produced
- 3 Reaction.—A solution of 1 g in 25 ml of water should not be acid to bromocresol green
- 4 Sulphate Dissolve 2 g in 50 ml of water, add 1 ml of dilute by drochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced

- 5 Heavy Metals and Zinc—Dissolve 1 g in 50 ml of water, add 1 ml of dilute acetic acid and 1 g of sodium acetate and pass hydrogen sulphide through the solution for a few seconds No colour, turbidity or precipitate should be produced
- 6 Iron.—Dasolve x g m 10 ml of water, add 1 ml. of dulut hydrochloric acid and 1 drop of N_{ID} (KMnO₄, mx, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of anyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml or standard iron solution (f ml = 0 or mg Fe) in the same manner
- 7 Nickel —Dissolve 1 g in 25 ml of water, heat to boiling and add 1 ml of moxime solution No deepening of the pink colour should occur
- 8 Barium.—Dissolve 1 g in 50 ml of water, add 1 ml of dilute sulphune acid and allow to stand for 2 hours. No turbidity or precipitate should be produced.
- 9 Calcium.—Dissolve 1 g in 30 ml of water, add 10 ml of ammonium chloride solution and 10 ml of dilute ammonia solution. Heat to boiling and completely precipitate the manganese by passing hydrogen sulphide through the solution. Filter cool the filtrate and add 4 ml of ammonium oxidate solution. No turbidity should be produced.
- to Magnesium and Alkalis —Dissolve 2 g in 50 ml of hot water, add 20 ml of freshly prepared ammonium carbonate solution and warm until the precipitate becomes granular, filter, evaporate the filtrate to dryness, add 2 drops of sulphunc acid and ignite gently Not more than 2 mg of residue should be obtained.
- 11 Oxidising and Reducing Substances—Dissolve 10 g in too ml of freshly boiled and cooled water and add 1 g of potassisum todide, 1 ml of starch solution and 5 ml of dilute hydrochloric and No blue colour should be produced. On the further addition of 0 05 ml of Nfto I a blue colour should appear
- 12 Assay —To or g add 3 ml of sulphure acid and evaporate to dryness Repeat the procedure with 2 ml of sulphure acid, add a further 1 ml and evaporate to fumes Dissolve the residue in a cooled maxture of too ml of water and 20 ml of intro acid, add 1 g of sodium bismuthate and shake for 1 minute Dhute with 100 ml of water, filter through an asbestos Gooch crueible and wash with nitre acid diluted with 33 volumes of water. To the filtrate and washings add 50 ml of N/to FeSO₄ (NH₄)₂SO₄ and back titte with N/to KMnO₄.
 - 1 ml N/10 FeSO4 (NH4)2SO4 ≅ 0 003958 g MnCl2 4H2O

Not less than 95 per cent and not more than roz per cent should be indicated

ANALAR

MANGANESE SULPHATE

$MnSO_{4-4}H_{2}O = 223 06$

Maximum Limits of Impunities

Chloride (CI)	0.001	per cent	
Heavy Metals (Pb)		per cent	
Iron (Fe)			
Nickel (Na)		per cent	
Zine (Zn)	0 001	per cent	
	0 05	per cent	
Calcium (Ca)	0.02	per cent	
Magnesium and Alkalis (as sulphates)	0 1	per cent	
Oxygen absorbed from KMnO, (O)	0.0008	per cent	
Oxidising and Reducing Substances			

- Description —Pink transparent crystals or an almost white powder
 Solubility.—Dissolve 5 g in 50 ml of water A clear family pink
- solution should be produced

 3. Reaction —A solution of 1 g in 25 ml of water should not be
- acid to bromocresol green
- 4 Chloride Dissolve I g in 50 ml of water and add I ml of dilute nitric acid and I ml of silver nitrate solution No opalescence should be produced
- 5 Heavy Metals and Zinc.—Dissolve I g in 50 ml of water, add 1 ml of acetic acid and I g of sodium acetate, and pass hydrogen sulphide through the solution for a few seconds. No colour, turbidity, or precipitate should be produced
- 6 Iron.—Dasolve 1 g in 10 ml. of water, add 1 ml of delute hydrochloric acid and 1 drop of N/10 KMnO4, mix, add 5 ml of ammonium thiocyanite solution and to ml of a mixture of equal volumes of amyl alcohol and amyl acetate, stake rigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0.01 mg Fe) in the same manuer
- 7 Nickel.—Dissolve 1 g in 25 ml of water beat to boiling and add 1 ml. of moxime solution. No deepening of the pink colour should occur.
- 8 Calcium —Dissolve I g in 30 ml of water, add to ml of ammonium chloride solution and to ml of dilute ammonia solution Heat to boiling and completely precipitate the manganese by passing hydrogen sulphide through the solution. Falter, cool the filtrate and add 4 ml of ammonium oxialte solution. For turnduty should be produced.
- g Magnessum and Alkalis.—Dissolve 2 g in 50 ml of hot water, add 20 ml of freshly prepared ammonium carbonate solution and

warm until the precipitate becomes granular, filter, evaporate the filtrate to dryness and ignute gently Not more than 2 mg of residue should be left

- 10 Oxygen Absorption—Dissolve 10 g in 100 ml of water and add z ml of dilute sulphuric acid 1 ml of phosphoric acid and 0 1 ml of N/10 K VinO₄ A pink colour should be produced
- 11 Oxidising and Reducing Substances—Dissolve to g in 100 ml of freshly boiled and cooled water and add 1 g of potassium todide 1 ml of starch solution and 5 ml of dilute hydrochloric acid No blue colour should be produced. On the further addition of 0.05 ml of N/10 I a blue colour should appear.
- 12 Assay —Dissolve 0.15 g in a cooled mixture of 100 ml of vater and 20 ml of natire acid add 1.5 g of sodium bismuthate and shake for i minute Dhute with 100 ml of water filter through an asbestos Gooch crueble and wash with natire acid diluted with 33 solumes of water To the filtrate and washings add 50 ml of N/10 FeSO₄ (NH₄)₂SO₄ and back titrate with N/10 KMO₄.
 - 1 ml N/10 FeSO, (NH,),SO, = 0 004461 g MnSO, 4H2O

Not less than 97 per cent, and not more than 101 per cent should be indicated.

ANALAR MERCURIC CHLORIDE

HgCl₂ = 271 52

Maximum Limits of Impurities

Water insoluble Matter mit Alcohol insoluble Matter mit Ether insoluble Matter mi

Non volatile Matter 0 0 0 per cent
Nitrate (NO₂) 0 00005 per cent
Arsenic (As₂O₂) 0 0000 per cent
(1 part per million)

- 1 Description —Heavy colourless crystals
- 2 Water-insoluble Matter.—Dissolve 5 g in 100 ml of water A clear colourless solution should be obtained
- 3 Alcohol Insoluble Matter.—Dissolve 1 g in 20 ml of 90 per cent alcohol A clear colourless solution should be obtained
- 4 Ether-insoluble Matter—Dissolve 1 g finely powdered in 30 ml of ether. A clear colourless solution should be obtained
- 5 Non-volatile Matter.—Mosten 2 g with sulphuric acid and ignite gently in a fume cupboard. Not more than x mg of residue should be left

MERCURIC CHLORIDE-continued

- 6 Nitrate—Dissolve o 1 g in 1 ml of water and add 4 ml. of diphenylbenzidne reagent. Any blue colour produced should not be greater than that produced by adding 4 ml of the reagent to 1 ml of water.
- 7 Arsenic —Mix intimately 5 g with 25 g of anhydrous sodium carbonate, mosten the mixture with 5 ml of water dry carefully and ignite strongly in a fume cupboard. Dissolve the residue in 50 ml of water add to ml of brominated hydrochloric acid and a few drops of stannous chloride solution and test as described in appendix 4 Any stan produced should not be greater than 2 0 005 mg standard stann.
- 8 Assay Dissolve o 5 g in 100 ml of water in a stoppered flash add 15 ml of calcium chloride solution 10 ml of potassium iodide solution 5 ml of formaldehyde solution and 20 ml of sodium hydroxide solution and shake continuously for 2 minutes. Add 25 ml of dilute acetic acid and 50 ml of N/10 1 shake until the precipitated mercury is completely redissolved allow to stand for 10 minutes and utrate the excess of todine with N/10 Na.S.O.

i ml N/10 I - o or358 g HgCla

Not less than 99 5 per cent should be indicated

ANALAR

MERCUROUS CHLORIDE

HgCl = 236 07

Maximum Lim is of Impurities

Non volatile Matter over per cent
Sulphate (SO4) ou per cent
Mercuric Salt (Hg) occop per cent.

Description,-A dense white powder

- 2 Solublilty.—Insoluble in water and in alcohol
- 3 Non-volatile Matter—Mossen 5 g with sulphune and and ignite gently in a fume cupboard. Not more than 1 mg of residue should be left
- 4 Sulphate—Shake 1 g with 50 ml of cold water for 5 minutes and filter, to the filtrate add 1 ml of dilute hydrochlone and and 1 ml of barnum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 5 Mercuric Salt.—Shake 2 g with 50 ml of cold water for 5 minutes and filter, to the filtrate add 1 drop of sodium sulphide solution No darkening in colour should be produced
- 6 Assay —To 0.7 g in a stoppered flask add 20 ml of water 50 ml of N/10 I and 5 g of potassium iodide allow to stand with occasional

shaking until complete solution is obtained and titrate the excess of iodine with N/10 Na,S,O,

1 ml N/10 - 0 02361 g HgCl

Not less than 99 6 per cent should be indicated

ANALAR MERCUROUS NITRATE

 $HgNO_3H_3O = 28063$

Maximum Limits of Impurities

Acid insoluble Matter

Non volume Matter o og per cent Sulphate (SO₄) o or per cent

I Description - Colourless or white crystals

- 2 Solubility Dissolve 5 g in 10 ml of water and 2 ml of dilute nitric acid A clear solution should be formed
- 3 Non-volatile Matter-Moisten 2 g with sulphuric acid and ignite gently in a fume cupboard. Not more than I mg of residue should be left
- 4 Sulphate.-Dissolve 2 g in 10 ml of dilute nitric acid and 40 ml of water add I ml of barrum netrate solution and allow to stand for a hour No turbidity or precipitate should be produced
- 5 Assay .- Treat r g with 5 ml of dilute scetic acid r g of sodium acetate 50 ml of N/10 I and 2 g of potassium todide shake vigorously in a stoppered bottle until solution is complete and titrate the excess of iodine with N/10 Na,S.O.

t ml N/10 I = 0-02806 g HgNO, HsO

Not less than or per cent should be indicated

ANALAR MERCURY

Hg = 200 61

Maximum Limits of Impurities

Acid insoluble Matter Non volatile Matter

nıl

o ooz per cent Other Metals no reaction

1 Description -A silver white liquid metal with a bright surface 2 Solubility .- Warm 10 g with 30 ml of nitric acid diluted with 30 ml of water Complete solution should result

(Continued overleaf \

MLRCURY-continued

- 3 Non-volatile Matter Evaporate 50 g on a sand bath in a fume cupboard Not more than 1 mg of residue should be left
- 4 Other Metals—Heat 5 g with a clear solution of 5 g of sodium thiosulphate in 5 ml of water in a boiling water bath for 1 minute. The surface of the mercury should remain bright

ANALAR METHYL ALCOHOL

CH,OH = 32 04

Maximum Lamits of Impurities

Acidity	۵	ne	mi	N/t	ner	cent
Alkalinity *	ō	02	mi	N/t	ner	cent
Non volatile Matter		-,				cent
Aldehydes and Ketones ((CHa),CO)					cent
Organic Impurities				asses		
Oxygen absorbed (O)			ò	0004	per	cent
Water					ner	cent

- Description.—A clear colourless liquid with a characteristic odour
 Solubility.—Miscible in all proportions with water forming clear
- 3 Reaction—Mix to ml with 10 ml of carbon diorade free water
- The solution should be neutral to bromothymol blue or should not require more than 0.05 ml of N/10 NaOH or N/10 HCl to render it so
 - 4 Specific Gravity (15 5°/15 5°) -0 796 to 0 798
 - 5 Refractive Index -n₂⁵⁰ 1 328 to 1 331
 6 Bolling Range -Not less than 95 per cent should distil between
- 64 5° and 65 5°
 7 Non volatile Matter Evaporate 30 ml to dryness on a water
- 7 Non volatile Matter Evaporate 30 ml to dryness on a water bath Not more than 0 5 mg of residue should be left
- 8 Aldehydes and Ketones—Mix in a stoppered cylinder 25 ml with 25 ml of water and 50 ml of hydrocylamine hydrochloride reagent allow to stand for 5 mixutes and titrate with N/10 NAOHI to the same green colour as shown by 50 ml of the reagent contained in a similar cylinder both being viewed down the axes of the cylinders Not more than 20 ml of N/10 NAOHI should be required
- 9 Organic Impurities—(a) Mix to ml with 10 ml of sodium hydroxide solution No colour should be produced
- (b) Mix 5 ml with 5 ml of sulphuric acid keeping the mixture cool Not more than a faint yellow colour should be produced
- to Oxygen Absorbed —To to ml add oo, ml of N/10 kMnO. The pink colour should persist for 10 minutes

tr Water — litrate 40 g slowly with Karl Fischer reagent until a small excess is present and a permanent odine colour is established Back titrate this excess electrometrically, with a standard solution of water in methyl alcohol. The volume of Karl Fischer reagent used should be equivalent to not more than 80 mg of water

ANALAR

METHYL ORANGE (pH range 28 to 46)

(CH2)2N C4H4 N N C4H4 SO2Na 3H2O - 381 39

Maximum Limits of Impurities

- I Description —Golden orange crystalline scales or powder
- 2 Solubility Dissolve o 1 g in 50 ml of hot water A clear deep orange solution should be produced
- 3 Chloride—Dissolve I g in 20 ml of boiling water add I ml of dilute nume acid cool and fifter to 10 ml of the filtrate add 40 ml of water and 1 ml of silver numate solution. No opalescence should be produced
- 4 Sulphate —Dissolve 1 g in 20 ml of boiling water add 1 ml of didute hydrochloric acid cool and filter to 10 ml of the filtrate add 40 ml of water and 1 ml of barum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- $_5$ Sensitivity —To 50 ml of water add 0 05 ml of N/10 NaOH and 0 1 ml of the aqueous solution from Test No 2 a clear yellow solution should be produced which should change to pink on the addition of 0 5 ml of N/10 HCl
- 6 Loss on Drying -Dry 1 g at 100° for 1 hour The loss in weight should not exceed 150 mg
- 7 Assay—Dissole the dired material from Test No 6 in water and dilute to 250 ml. To 50 ml add 100 ml of water and 15 g of sodium hydrogen tartrate. Boil and litrate the hot solution slowly with shaking with N/10 TiCl, in an inert atmosphere until completely decolorised Run a blank determination using 10 ml of the sample solution 140 ml of water and 15 g of sodium hydrogen tartrate

r ml N/10 T1Cl3 - 0 008184 g C14H14N2O2S\2

Not less than 95 per cent should be indicated.

ANALAR

METHYL RED

(pH range 42 to 63)

 $(CH_1)_1N C_0H_1 N N C_0H_1 COOH = 269 29$

Maximum Limits of Impunities

Alcohol insoluble Matter

nel Sulphated Ash 0 5 per cent Moisture 1 o per cent

- 1 Description -A dark red or violet crystalline powder
- 2 Solubility -Almost insoluble in water Dissolve o i g in 50 ml of hot go per cent alcohol, a clear red solution should be obtained
- 3 Sulphated Ash -Moisten 1 g with sulphure acid and ignite g ntly Not more than a me of residue should be left 4 Sensitivity -To so ml of water add e os ml of N/10 NaOH and
- o 1 ml of the solution from Test No 2 2 clear yellow solution should he produced which should change to red on addition of o r ml of N/10 HC
- 5 Moisture -Dry 1 g at 100° for 1 hour The loss in weight should not exceed to mg
- 6 Assay -Dissolve the dried material from Test No 5 in 100 ml of water and 3 ml of sodium hydrovide solution and dilute with water to 250 ml. To 50 ml add 50 ml of alcohol 1 ml of dilute hydrochlone acid and to g of sodium potassium tartrate dissolved in 50 ml of water Boil and titrate the hot solution slowly with shaking with N/10 TiCla in an inert atmosphere until completely decolorised Run a blank deter mination using 10 ml of the sample solution 50 ml of alcohol 4 drops of dilute hydrochiloric acid and 10 g of sodium potassium tartrate dis solved in go ml of water

1 ml N/10 TiCl, = 0 006732 g C15H15N2O,

Not less than 95 per cent should be indicated

ANALAR MOLYBDENUM TRIOXIDE

 $MoO_2 = 143.05$

Maximum Limits of Impurities

Lower Oxides	0 05 per cent
Chlonde (CI)	o ooş per cent
Sulphate (SO ₄)	o or per cent
Nitrate (NO ₃)	o oo2 per cent
Phosphate (PO ₄)	o cor per cent
Heavy Metals and Iron	0 002 per cent
Ammonia	no reaction

- 1 Description -A slightly yellow or greenish yellow powder
- 2 Lower Oxides —Dissolve 5 g in 20 ml of dilute ammonia solution, filter, wash with dilute ammonia solution dry any insoluble matter at 110° and weigh. Not more than 2 5 mg should be obtained
- 3-4 Tests for Chloride and Sulphate are carried out as described for Molybdic Acid, filtering the solutions if necessary
- 5 Nitrate.—Mix 1 g with 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphunc acid and heat to boiling. The blue colour should not entirely disappear.
- 6-7 Tests for Phosphate and Heavy Metals and Iron are carried out as described for Molybdic Acid
- 8 Ammonia —Boil r g with 5 ml of sodium hydroxide solution No odour of ammonia should be perceptible
- 9 Assay —Carry out the assay as described for Molybdic Acid Not less than 99 per cent MoO₃ should be indicated

ANALAR MOLYBDIC ACID

 $MoO_3 = 143.95$ $H_2MoO_4 \approx 161.97$

Maximum Limits of Impurities

Lower Oxides	oor percen
Chloride (Cl)	o oog per cen
Sulphate (SO ₄)	oor per cen
Phosphate (PO ₄)	o oot per cen
Heavy Metals and Iron	0 002 per cent

(Continued overleaf)

MOLVEDIC ACID-continued

- z Description -A white or pale cream coloured powder, containing acid ammonium sale
- 2 Lower Oxides -Dissolve 5 g in 15 ml of dilute ammonia solution, filter, wash the filter with dilute ammonia solution, dry any insoluble matter at 110° and weigh Not more than o 5 mg should be obtained
- 3 Chloride -Dissolve 1 g in 25 ml of dilute ammonia solution and 45 ml of water and add 1 g of citric acid, when dissolved add o I ml. of dilute nitric acid and I ml of silver nitrate solution. Any opalescence produced should not be greater than that given by o 5 ml of standard chloride solution (1 ml = 0 1 mg Cl) in an equal volume of solution containing the quantities of reagents used in the test
- 4 Sulphate.-Dissolve 2 g in 5 ml of dilute ammonia solution and as ml of water and add 2 g of citric acid when dissolved add o I ml of dilute hydrochlone acid and I ml of barium chlonde solution and allow to stand for I hour. No turbidity or precipitate should be produced
- 5 Phosphate Pour the solution from Test No 2 into 75 ml of dilute nitric acid and allow to stand at about 40° for 2 hours. No yellow precipitate should be produced
- 6 Heavy Metals and Iron Dissolve of g in 5 ml of dilute ammonia solution and 45 ml of water and add 1 drop of sodium sulphide solution. Any darkening in colour should not be deeper than the 'standard colours" defined in appendix 2
- 7 Assay -Dissolve of g m 60 ml of water and to ml of dilute ammonia solution and then add so mi of dilute sulphune seid and proceed as described for Ammonium Molybdate using this solution in part (6) part (a) being carried out as described

Not less than 85 per cent MoO, should be indicated

ANALAR

«-NAPHTHOL

C10H2OH == 144 16

Maximum Limits of Impurities

Alcohol insoluble Matter Sulphated Ash

nil o os per cent

Naphthalene Organic Acids no reaction no reaction

1 Description -Colourless or slightly pink crystals or crystalline powder with a characteristic odour

- Solubility.—Slightly soluble in water. Two grams should dissolve in 10 ml. of ethyl alcohol forming a clear and almost colourless solution.
 - 3. Melting Point .- 95° to 97°.
- 4. Sulphated Ash.-Moisten 2 g. with sulphuric acid and ignite gently. Not more than 1 mg. of residue should be left.
- 5. Naphthalene.—Dissolve 1 g. in 3 ml. of alcohol and add 50 ml. of dilute ammonia solution. The solution should not be more than faintly opalescent and should not possess more than a slight tint.
- 6. Organic Acids.—Boil I g. with 50 ml. of water, cool and filter. The filtrate should be neutral to litmus paper

AnalaR B-NAPHTHOL

C.,H.OH = 144 16

Maximum Limits of Impurities

Alcohol-insoluble Matter Sulphated Ash Naphthalene

a-Naohthol

nil o oz per cent no reaction o t per cent

- t. Description.—Coloutiess or slightly pink crystals or crystalline powder with a characteristic odour.
- z. Solubility.—Slightly soluble in water Two grams should dissolve in 10 ml of ethyl alcohol forming a clear and almost colourless solution.
 - 3. Melting Point.-122° to 123°.
- 4. Sulphated Ash.—Moisten 5 g with sulphuric acid and ignite gently. Not more than 1 mg. of residue should be left.
- 5. Naphthalene.—Dissolve r g m 3 ml. of alcohol and add 50 ml. of dlutte ammonts solution. The solution should not be more than slightly opalescent and should not possess more than a slight tint.
- 6. α-Naphthol.—Boil r g, with 20 ml of water, cool and filter. To the filtrate add 2 ml of freshly prepared sodium hypobromite solution.* A clear yellow solution, free from any brown, red or violet coloration, should be obtained.

Dissolve 2 5 g. of sodium hydroxide in 25 ml of water and add 1 ml of bromine,

ANALAR *α-NAPHTHYLAMINE*

C18H2NH2 = 143 18

Maximum Limits of Impurities

Acid insoluble Matter

- Sulphated Ash o oz per cent r Description.-Colourless or slightly coloured crystals or crystalline
- powder with a characteristic odour 2 Solublity - Dissolve 1 g in 30 ml of warm dilute acetic acid. The solution should be clear and not more than slightly coloured
 - 3 Melting Point,-49° to 51°
- 4 Sulphated Ash Moisten 5 g with sulphuric acid and ignite gently Not more than I mg of residue should be left

ANALAR

NICKEL CHLORIDE

NiCl, 6H,O = 237 70

Maximum Limits of Impurities

Sulphate (SO ₄)	oor per cent
Heavy Metals (Pb)	o coa per cent
Cobalt (Co)	o coos per cent
Iron (Fe)	o oor per cent
Zinc (Zn)	o co25 per cent
Barium (Ba)	o oz per cent
Alkalis and other Metals (Na)	o og per cent

- I Description -Apple green crystals or crystalline powder
- 2 Solublity.-Readily soluble in alcohol Dissolve 5 g in 50 ml of water, a clear green solution should be produced
- 3 Sulphate Dissolve 1 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and z ml of barrum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 4 Heavy Metals Dissolve I g in 50 ml of water, add 0 I ml of dilute hydrochloric acid and pass hydrogen sulphide through the solution for a few seconds Not more than a very faint darkening should he produced/
- 5 Cobalt.-Dissolve 5 g in to ml of water, add I ml of dilute hydrochloric acid and I drop of N/10 kMnO4, mix, add 5 ml of

anmonium thocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, abake vigorously and allow to separate Reject the lower layer and thoroughly stake the upper layer with 5 ml of ammonium phosphate solution and 5 ml of ammonium thiocyanate solution, allow to separate and draw off the lower layer into a second separator. Wash the liquid in the first separator with a mixture of 1 ml of ammonium thiocyanate solution of ammonium thiocyanate solution and 1 ml of water and draw off the lower layer into the second separator Any blue colour in the upper layer should not be deeper than that produced by treating 2 5 ml of standard cobalt solution (1 ml = 0 or mg Co) in the same manner.

- 6 Iron—To the aqueous liquid in the second separator from Test No 5 add it mi of hydrochloric acid and ro mi of the mixture of amyl alcohol and amyl accitate, shake vigorously and allow to separate. Any colour in the upper layer should not be greater than that produced by treating 5 mi of standard ron solution (ii mi = 0 or im Fe) with hydrochloric acid, ammonium thiocyanate, and the mixture of amyl alcohol and amyl accitate in the same manner.
- 7 Zine.—Dissolve 1 g in 50 ml of water and to 2 5 ml of this solution add 7 5 ml of water, i drop of ammonium thiocyanate solution, i drop of dilute sulphuric acid and 0 4 ml of a 0 og per cent alcoholic solution of p-dimethylamino stryvl-ß naphthiazole methyl i cidide. The solution should show no pink or orange colour when compared with a solution containing 10 ml of water and the reagents used in the test
- 8 Barium —Dissolve I g m 50 ml of water, add I ml of dilute sulphune acid and allow to stand for I hour No turindity or precipitate should be produced
- 9 Alkalis and other Metals—Evaporate the solution from Test No to to drynness, ignite gently and weigh the residue Not more than 2 mg should be obtained
- 10 Assay.—Dissolve 2 g in 55 ml of water and add 20 ml of dilute sulphuric acid followed by 75 ml of strong ammonia solution Warm to 70° and electrolyse the solution for 00 minutes with a current of 1 5 to 20 amperes using a weighed copper-plated platinum cathode, as described in appendix 5 Wash the cathode with water, then with acctone, dry and weigh

Weight of N₁ × 4 050 = weight of N₁Cl₂ 6H₂O Not less than 98 per cent should be indicated

ANALAR

NICKEL NITRATE

 $N_1(NO_2)_2 6H_1O = 200 80$

Maximum Limits of Impurities

Chloride (CI) .	0 002 per cent
Sulphate (SO ₄)	oot per cent
Cobalt (Co)	o coos per cent
Iron (Fe)	o cor per cent
Zinc (Zn)	g ooss per cent
Alkalis and other Metals (Na)	0 03 per cent

- 1. Description .- Green crystals or crystalline powder
- 2 Solubility,—Dissolve 5 g in 50 ml of water A clear green solution should be produced
- 3. Chloride.—Dissolve I g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 4 Sulphate.—Dissolve 1 g in 50 ml. of water, add 1 ml of dilute hydrochloric acid and 5 ml of barum chloride solution and allow to stand for 1 bour No turbulty or precipites should be produced.
- 5-7 Tests for Cobalt, Iron and Zinc are carried out as described for Nickel Chloride
- 8 Alkalis and other Metals.—Evaporate the solution from Test No 9 to dryness, ignite gently and weigh the residue Not more than 2 mg should be obtained
- 9 Assay.—Dissolve 2 g in 10 ml of water, add 10 ml of sulphune acid and evaporate nearly to dryness. Cool, dissolve the residue in 75 ml of water and add 75 ml of strong ammonia solution. Warm to 70 and electrolyse the solution for 90 minutes with a current of 1.5 to 2.0 amperes using a veighed copper-plated platinum cathode, as described in appendix 5. Wash the cathode with water, then with acetone, dry and weigh

Weight of Ni × 4 055 = weight of Ni(NO₃), 6H₂O

Not less than 98 per cent should be indicated.

ANALAR

NICKEL SULPHATE

 $N_1SO_4 6H_2O = 262 85$ $N_1SO_4 7H_2O = 280 87$

Maximum Limits of Impurities

Ammonia	no reaction
Alkalıs and other Metals (Na)	o og per cent
Zinc (Zn)	o oo25 per cent
Iron (Fe)	o oot per cent
Cobalt (Co)	o ocos per cent
Heavy Metals (Pb)	0 004 per cent
Chloride (Ci)	o oog per cent

- I Description.—Emerald green crystals or crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear green solution should be produced
- 3 Chloride.—Dissoive 3 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" described in appendix 2.
- 4-7 Tests for Heavy Metals, Cobalt, Iron and Zinc are carried out as described for Nickel Chloride
- 8 Alkalis and other Metals.—Evaporate the solution from Test No 10 to dryness, ignite gently and weigh the residue Not more than 2 mg should be obtained
- 9 Ammonla,—Dissolve 1 g in 3 ml of water, add 5 ml of sodium hydroxide solution and boil No odour of ammonia should be perceptible
- 10 Assay.—Dissolve z g in 75 ml of water, add 75 ml of strong ammonia solution, warm to 70° and electrolyse the solution for 90 minutes with a current of 1 5 to 20 amperes using a weighted copper-plated platinum exhode, as described in appendix 5 Wash the cathode with water, then with acctone, dry and weigh

Weight of Ni × 4 786 = weight of NiSO, 7H2O

Not less than 98 per cent and not more than 108 per cent should be indicated

ANALAR NITRIC ACID (sp. gr. I 42)

HNO. = 62 016

Maximum Limits of Impurities

Non volatile Matter	o oo 1 per cent
Chloride (Cl)	o coor per cent
Iodate (IO ₃)	0 0005 per cent
Sulphate (SO ₄)	0 0003 per cent
Heavy Metals (Pb)	0 0002 per cent
Iron (Fe)	ereces per cent
Arsenie (As ₂ O ₃)	o coccos per cent
	(0 05 part per million)

- 1 Description -A clear colourless furning liquid
- 2 Non-volatile Matter,—Evaporate 70 ml 10 dryness and ignite gently. Not more than 1 mg of residue should be left
- 3 Chloride -- Dulute 10 ml with 40 ml of water and add 1 ml of silver nitrate solution. No opalescence should be produced
- 4 lodate Dilute 20 ml with 20 ml of water add a small granule of zinc and 3 ml of chloroform and shake The chloroform should not be coloured violet
- 5 Sulphate To 50 ml add 0.2 ml. of N/1 Na₂CO₃ and evaporate to dryness on a water bath dissolve the residue in 10 ml of water and ml of N/1 HCl filter if necessary, and add z ml of barum chloride solution. Any turbadity produced should not be greater than the standard mirbadity "defined in anoendix 2.
- 6 Heavy Metals and Iron —To 7 ml add 10 ml of water and 35 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Arsente—To 7 ml add 5 ml of sulphure acid and evaporate until fumes of sulphure acid are evolved, cool, add 5 ml of water and again evaporate to fuming, cool, dibute with 50 ml of water add 10 ml of stannated hydrochloric acid and test as described in appendix 4 Any stan produced should not be greater than a coop mg standard stam
- 8 Assay Dilute 3 g with 50 ml of water and titrate with N/i NaOH using methyl red as indicator

1 ml N/1 NaOH = 0-06302 g HNO3

About 70 per cent should be indicated

ANALAR

NITRIC ACID (FUMING)

(sp. gr. 1.5)

HNO, = 63 016

Maximum Limits of Impurities

Non volatile Matter	o oor per cent
Chloride (Ci)	o oooi per cent
Iodate (IO ₁)	0 0005 per cent
Sulphate (SO ₄)	o ooo3 per cent
Heavy Metals (Pb)	o oooz per cent,
Iron (Fe)	o coot per cent
Arsenic (As ₂ O ₄)	o coccos per cent
	(o or part per million)

- 1 Description -A clear yellow fuming liquid
- 2-7 Other Tests —The 2cid should conform to Tests Nos 2 to 7 described under Nitric Acid (sp gr 1 42)
- 8 Assay -Dilute 2 g with 50 ml of water and titrate with N/t NaOH using methyl red as indicator

1 ml N/1 NaOH = 0.06302 g HNO₃ Not less than 05 per cent should be indicated

ANALAR NITROBENZENE

C₄H₅ NO₂ = 123 11

Maximum Limit of Impurity

o os ml N/s per cent

- Description —A pale yellow liquid with a characteristic odour
- 2 Weight per m! at 20° -1 200 to 1 203 g
- 3 Refractive Index -n, 1 5515 to 1 5530
- 4 Freezing Point.-Not below 5-0"

Acidity

- 5 Boiling Range -Not less than 95 per cent should distil between 210° and 212°
- 6 Acidity—Shake 16 ml with 50 ml of water for 1 minute and allow to separate. The aqueous layer should not require more than 0 1 ml of N/10 NaOH to neutralise any acidity bromophenol blue being used as indicator.

AnalaR D-NITROBENZOYL CHLORIDE

NO, CaH, COCI -- 185 57

Max mum Limits of Impurities

Sulphated Ash
Phosphorus Compounds (P)
Sulphur Compounds (S)

o 1 per cent
0 0025 per cent
0 003 per cent

- I Description —Yellon crystals
- 2 Solubility —Decomposed by water and by alcohol
- 3 Melting Point -71° to 74°
- 4 Sulphated Ash Moisten r g with sulphuric acid and ignite gently Not more than r mg of residue should be left
- 5 Phosphorus Compounds—Boil 1 g with 1 ml of water and 2 ml of nitro acid for 1 minute add 20 ml of water cool and filter then add 10 ml of ammonium nitromolybidate solution and maintain at about 40° for 2 hours. No yellow precipitate should be produced.
- 6 Sulphur Compounds—Boll I g with I ml of water and 2 ml of miner and for I minute add 25 ml of water cool and filter then add 20 ml of water and I ml of banum chloride solution and allow to stand for I hour No turbidity or precipitate should be produced
- 7 Assay —Dissolve 0.4 g in 20 ml of pyridine aild very slo ily 20 ml of water and titrate with N/10 NaOH using phenolphthalein as indicator.

Not less than 98 per cent should be indicated

To the neutralised liquid add 20 ml of nitric acid and 25 ml of N/to AgNO₂ Filter wash with water and titrate the filtrate and washings with N/to NH,SCN using ferric ammonium sulphate as indicator

Not less than 98 per cent should be indicated

ANALAR NITRON

(1:4-Diphenyl-3:5-endanilo-4:5-dihydro-1:2:4-triazole)

 $C_{20}H_{10}N_4 = 31236$

Maximum Limit of Impurity

Sulphated Ash 0 2 per cent

Sensitivity to Nitrate (NO2) I 17 000 minimum

- I Description -A yellow crystalline powder
- 2 Solubility Insoluble in water Dissolve i g in 3 ml of dilute acetic acid and 7 ml of water A clear pale yellow solution should be obtained.
 - 3 Melting Point -184° to 180° with decomposition
- 4 Sulphated Ash Moisten 0.5 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Sensitivity to Nitrate —To 10 ml of M/1000 kNO3 add one drop of dilute sulphune acid and 1 ml of the solution prepared in Test No 2 A distinct white crystalline precipitate should form within 30 minutes

ANALAR OXALIC ACID

 $(COOH)_2 2H_2O = 126 07$

Maximum Limits of Impurities

Ash	o o 2 per cent
Chloride (CI)	o oor per eent
Sulphate (SO ₄)	oor percent
Nitrate (NO ₃)	0 002 per cent
Heavy Metals (Pb)	o oot per cent
Iron (Fe)	o ooo5 per cent
Calcium (Ca)	c oos per cent
Magnesium (Mg)	oo: per cent
Ammonia	no reaction

- 1 Description,—Colourless crystals free from efflorescence
- 2 Solubility.—Readily soluble in alcohol Dissolve 5 g in 50 ml of warm water, a clear colourless solution should be produced

(Continued overleaf)

OXALIC ACID-continued

- 3 Ash -Ignite 5 g gently, not more than 1 mg of residue should be left
- 4 Chloride.—Dissolve 2 g in 45 ml of warm water and add 5 ml of dilute nutrie acid and 0 r ml of silver nutrate solution No opalescence should be produced
- 5 Sulphate—Dissolve 1 g m 20 ml of water, add 1 g of anhydrous sodium carbonate, evaporate to dryness and gante under conditions that will not introduce sulphur Dissolve the residue in 15 ml of hot water, add 5 ml of hydrogen peroxide (20 volumes), boil, cool add 6 ml of ditute hydrochloric aeid and fifter To the fiftrate add 20 ml of water and 2 ml of barum ehloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Nitrate.—Dissolve 1 g in 10 ml of water, add 1 ml of standard indigo solution and 20 ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.
- 7 Heavy Metals and Iron—Dissolve 2 g in 40 ml of water, add r om l of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2.
- 8 Calcium.—Dissolve I g in 20 ml of water, add 5 ml of dilute ammonas solution and allow to stand for 4 hours. No turbidity or precipitate should be produced

 9 Magnesium.—To the solution produced in Test No. 8 add 5 ml.
- of ammonium phosphate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced
- to Ammonia —Boil x g with 5 ml of sodium hydroxide solution No odour of ammonia should be perceptible
- 11 Assay.—(a) Dissolve 3 g in 50 ml of water and titrate with N/1 NaOH using phenolphtbalein as indicator

 $_{1}$ ml N/1 N2OH \equiv 0 06303 g (COOH), $_{2}$ H $_{2}$ O

Not less than 99 8 per cent should be indicated

(b) Dissolve 0 3 g in 100 ml of water, add 5 ml of sulphurie acid and titrate at 60° to 80° with N/10 KMnO4

1 ml N/10 KMnO4 = 0-006303 g (COOH); 2H4O

Not less than 99 8 per cent should be indicated

ANALAR

PERCHLORIC ACID

(sp. gr. | 70) 72 per cent.

HClO4 = 100 47

Maximum Limits of Impurities

Non-volatile Matter	0 003 Per cent
Chloride (CI)	0 0001 per cent
Chlorate (ClO ₂)	0 002 per cent
Sulphate (SO ₄)	o ooos per cent
Phosphate (PO ₄)	0 0002 per cent
Silicate (SiO.)	o ooo; per cent
Heavy Metals	passes test
Lead (Pb)	o ocoog per cent
Copper (Cu)	o cocos per cent
Iron (Fe)	o oooi per cent
Manganese (Mn)	o opoos per cent
Ammonia (NH ₃)	o ooos per cent
Nitrogen (N)	o oor per cent
Arsenic (As ₂ O ₃)	o cocot per cent
	(or part per million)

- 1 Description -A clear colourless liquid
- 2 Solubility —Miscible in all proportions with water forming clear colourless solutions
- 3 Non-volatile Matter.—Evaporate 10 ml to dryness, add a few drops of sulphuric acid, and ignite gently Not more than 0 5 mg of residue should be left
- 4 Chtoride.—Dilute 6 ml with 45 ml of water and add 1 ml of dilute mitric acid and 1 ml of silver mitrate solution. No opalescence should be produced
- 5 Chlorate —Dilute 6 ml with 40 ml of water, and add 2 ml of nitric acid, 0 i g of sodium nitrite and 1 ml of silver nitrate solution, and allow to stand for 5 minutes Any opalescence produced abould not be greater than the "standard opalescence" defined in appendix 2
- 6 Sulphate —Dilute 6 ml with 25 ml of water, neutralise with dilute ammonia solution (about 15 ml), acidify with 2 drops of the sample, add 5 ml of barium chloride solution and allow to stand for 5 hours. No turbidity or precipitate should be produced.
- 7 Phosphate and Silicate —Evaporate 3 ml in a Pyrex disb nearly to dryness, dissolve the residue in 10 ml of water, neutralise to litmus paper with a measured quantity of dilute ammoma solution, dilute to (Continued overleaf)

PERCHLORIC ACID-continued

20 ml, add 1 ml of dilute sulphure acid, 1 ml of phosphate reagent No. 1, and 1 ml of phosphate reagent No. 2, and pice in a water-bath at 60° for 5 minutes. Any blue colour produced abould not be deeper than that produced by 1 ml of standard phosphate solution (1 ml = 0 ot mg PCQ), to which has been added the same volume of dilute ammonia solution as was required in the test, sufficient of the sample to neutralise it, and containing the quantities of the reagents used in the test

- 8 Heavy Metals.—Dilute 6 ml with 25 ml of water, add 20 ml of dilate ammonia solution, and pass hydrogen sulpfied through the solution for a few seconds than the "standard colours" defined m appendix 2
- g Lead.—Dilute 6 ml with 25 ml of water, add 20 ml of dilute ammonia solution, add 1 ml of potassium cyanide solution and 5 ml of a 0.005 per cent w/y chloroform solution of diphenylthocarbazone, and shake vigorously. Allow to separate and thoroughly shake the lower layer with 5 ml of dilute ammonia solution. Any red colour produced in the chloroform layer should not be deeper than that of the chloroform layer produced by treating 40 ml of water and 0 5 ml of standard lead solution (1 ml = 0.01 mg Pb) with 5 ml of dilute ammonia solution, 1 ml of potassium cyanide solution and 5 ml of a 0.005 per cent w/y chloroform solution of diphenylthocarbazone and shaking vigorously
- 10 Copper.—Dilute 6 ml with 20 ml of water, add it g of ettre acid, dilute animonal solution until alkaline (about 20 ml) and 1 ml of a 0.1 per cent aqueous solution of sodium diethyldithiocarbanate and shake with three successive portions 5 ml, 3 ml and 2 ml of carbon tetrachloride. Dry the combined carbon tetrachloride extracts with a little anhydrous sodium sulphate. Any yellow colour produced should not be greater than that obtained by treating 0 5 ml of standard copper solution (t ml, = 0 or mg Cu) in the same manner.
- 11 Fron.—Dilute 6 ml with 25 ml of water and add 1 drop of N/10 KMnO₆, mix, add 5 ml of ammonium theocyanate solution and io ind 6 mixture of equal volumes of amyl alcohol and amyl acctate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 of mg Fe) in the same manner.
- 12 Manganese.—Dilute 3 ml with 10 ml of water, add 2 ml of nutric acid and 0.5 g of sodium bismuthate, shake occasionally during 5 minutes, and allow to stand until clear. No pink colour should be produced
- 13 Ammonia.—Didute g ml with 35 ml of water and add to ml of sodium hydroxide solution and z ml of Nessler's reagent. Any colour produced should not exceed that given by 25 ml of standard ammonia solution (1 ml \Rightarrow 0 or mg NH₂) in an equit volume of solution containing the quantities of regents used in the test
- 14 Nitrogen Dilute 6 ml with 50 ml of water, 2dd 1 g of powdered Devarda's Alloy, place in a Kjeldahl distillation apparatus, 2dd

25 ml. of sodium hydroxide solution and allow to stand for x hour. Distil about 25 ml., collect the distillate m x0 ml. of N/100 H₂SO₄, and titrate the excess of and with N/100 NaOH, using methyl red as indicator. Carry out a blank determination in the same manner. The difference between the two titrations should not exceed 0.7 ml.

- 15. Arsenic.—Dlute 12 ml with 50 ml. of water; add to ml. of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0 002 mg. standard stain.
 - 16. Assay.—Dilute 4 g. with 50 ml of water and titrate with N/1 NaOH using phenolphthalein as indicator.

1 ml. N/1 NaOH = 0·1005 g. HClO4

Not less than 71 and not more than 73 per cent, should be indicated

ANALAR PERCHLORIC ACID

(sp. gr. i.54) 60 per cent.

HCIO, = 100.47

Maximum Limits of Impurities

Non-volatile Matter	. 0	003	per c	ent
Chloride (CI)		1000		
Chlorate (CIO ₂)		002	per o	
Sulphate (SO ₄)		0005		
Phosphate (PO ₄)		0002		
Silicate (SiO ₂)		1000		erat
Heavy Metals	p:	asses t	est	
Lead (Pb) ,	0	00005	per o	ent
Copper (Cu) .	0	00005	per o	ent.
Iron (Fe)	0	0001	per c	ent
Manganese (Mn)	0	00005	per o	ent.
Ammonia (NH ₂)	0	0005	per c	ent
Nitrogen (N)	0	100	per ce	ent
Arsenic (As,O ₃)	0.	100001	per to	ent.
,	(orp	art pe	r milli	(ao

- 1. Description.-A clear colourless liquid.
- 2-16.—These tests are carried out as described for Perchloric Acid 72 per cent.
 - 16. Assay .- Not less than 60 per cent. should be indicated.

ANAIAR PETROLEUM FTHER

Maximum Limit of Impures

Non	volatile Matter	

0 007 per cent

- 1 Description -A clear colourless mobile liquid
- 2 Boiling Range -Not less than 90 per cent should distil within the appropriate range -(5) 60° to 80°
 - (1) below 40°
 - (2) 40° to 50° (3) 40° to 60° (4) 50° to 60° (6) 80° to 100° (7) 100° to 120° (8) above 120°
- Non-volatile Matter Evaporate so ml to dryness on a water bath Not more than I me of residue should be left

ANALAR

PETROLEUM ETHER (Free from Aromatic Hydrocarbons)

Maximum Limits of Impurities

Non volatile Matter Aromatic Hydrocarbons

o cog per cent o s per cent

- I Description —A clear colourless mobile liquid
- 2 Boiling Range -Not less than 90 per cent should distil with n the appropriate range -
 - (1) below 40°
- (s) 60° to 80° (6) 80° to 100°
- (2) 40° to 50° (3) 40° to 60° (4) 50° to 60° (7) 100° to 120°
 - (8) above 120°
- 3 Non-volatile Matter -- Evaporate 50 ml to dryness on a water bath Not more than I mg of residue should be left
- 4 Aromatic Hydrocarbons -Shake so ml with 30 ml of sulphuric acid continuously for 30 minutes Separate the petroleum ether, wash with water and dry over calcium chloride Mix 5 ml of this with 5 ml of freshly distilled dry aniline and warm until clear. Allow to cool very slowly and note the temperature to the nearest o 1° at which the mixture first becomes cloudy

Determine the clouding point for a mixture of 5 ml of the original petroleum ether (previously dried) and 5 ml of freshly distilled dry

aniline in the same manner. Each 1° difference between the two readings is equivalent to 1 per cent, of aromatic hydrocarbons

Not more than o s per cent should be indicated.

Note—If the petroleum ether boils below the clearing point, carry out the test with a mixture of equal parts of petroleum ether, boiling range 100° to 120° (free from aromatic hydrocarbons), and the sample, and correct the result accordingly

ANALAR o-PHENANTHROLINE

 $C_{12}H_4N_2H_4O = 198 22$

Maximum Limit of Impurity

Sulphated Ash

0 25 per cent

Sensitivity to Iron (Fe) 1 10,000,000 minimum

- 1 Description —White to cream coloured crystals or crystalline powder
- 2 Solubility.—Readily soluble in alcohol Dissolve o 1 g in 20 ml of water A clear colourless solution should be obtained
 - 3 Melting Point .-- 97° to 102°
- 4 Sulphated Ash,-Moisten o 2 g with sulphuric acid and ignite Not more than 0 5 mg of residue should be left
- 5 Sensitivity.—(a) As redox indicator—Add o 5 ml of a 0.5 per cent aqueous solution to 0.5 ml of N/10 ferrous ammonium sulphate solution, and dilute with 50 ml of dilute sulphure acid. The solution should be coloured red and the sclour should be discharged on the addition of 0.1 ml of N/10 K,Cr2O₁.
- (b) As non reagent—Add i ml of a o 5 per cent aqueous solution to a maxture of 10 ml of water, o 1 ml of standard iron solution (1 ml = 0 or mg Fe) and 1 ml of hydroxylamine hydrochloride solution (10 per cent). The colour produced should be definitely pink when compared with a solution containing to ml of water and 1 ml of hydroxylamine hydrochloride solution (10 per cent) and 1 ml of the o 5 per cent reagent solution.

ANAIAR PHENOI

$C_4H_4OH = 04 II$

Maximum Limits of Impurities

Insoluble Matter Non volatile Matter

o oz per cent

- Tarry Matter no reaction
- I Description —Colourless hygroscopic crystals with a characteristic odour a Solubility -- Dissolve 5 g in 100 ml of water A clear colourless
- solution should be produced 3 Freezing Point -40° to 41°
- 4 Non-volatile Matter Evaporate 5 g on a water bath Not more than I mg of residue should be left
- 5 Tarry Matter-Dissolve 5 g in 15 ml of sodium hydroxide solution A clear colourless solution free from tarry odour should be ohtamed

ANALAR

PHENOLPHTHALEIN $(C_4H_4OH)_4C C_4H_4 CO O = 318 31$

Maximum Limits of Impurities

Alcohol insoluble Matter nd Alkalı insoluble Matter nd

Sulphated Ash o os per cent Chloride (CI) o oor per cent

Sulphate (SO₄) o or per cent

- I Description -A white crystalline powder
- 2 Solublisty -- Almost insoluble in water Completely soluble in alcohol One gram should dissolve completely in 8 ml of N/1 NaOH and 100 ml of water forming a clear deep red solution
 - 3 Melting Point,-258° to 261°
- 4 Sulphated Ash.-Noisten 2 g with sulphuric acid and ignite gently Not more than 1 mg of residue should be left
- 5 Chloride -Shake 1 g with 50 ml of water and 1 ml of dilute nutric acid for 5 minutes and filter, and to the filtrate add 1 ml of silver nitrate solution No opalescence should be produced

6 Sulphate.—Shake 1 g with 50 ml of water and 1 ml of dilute hydrochloric acid for 5 minutes and filter, 10 the filtrate add 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or oreconstate should be produced.

ANALAR

PHENYLHYDRAZINE HYDROCHLORIDE

C4H5 NH NH2 HCI = 144 60

Maximum Limits of Impurities

Insoluble Matter Sulphated Ash passes test o or per cent

- r Description -- White or pale cream crystalline powder or leaflets
- 2 Solubility.—Dissolve 1 g in 50 ml of water An almost clear and colourless solution should be produced
- 3 Sulphated Ash.—Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 4 Assay.—Dissolve 0.2 g in 25 ml of water, add 20 ml of dilute hydrochloric acid and 5 ml of potassium chandes solution and titrate with M/20 RTO3 until the dark brown solution which is formed becomes light brown, then add 5 ml of starch solution and continue the titration until the blue colour disappears

1 ml M/20 KIO₃ ≈ 0 00723 g C₈H₅ NH NH₂ HCl

Not less than 98 per cent should be indicated

ANALAR PHLOROGLUCINOL

 $C_4H_4(OH)_3 2H_4O (1 3 5) \approx 162 14$

Maximum Limits of Impurities

Sulphated Ash Resorcinol Diresorcinol o o5 per cent no reaction no reaction

1 Description.-White or pale cream coloured crystals

2 Solubility.—Readily soluble in alcohol Dissolve i g in 50 ml of water, a clear, not more than faintly yellow solution should be produced

(Continued overleaf)

PHLOROGLUCINOL-continued

- 3 Melting Point.—218° to 219°, after removal of water of crystallisation by drying at 110° for 1 hour
- 4 Sulphated Ash Moisten r g with sulphuric acid and ignite gently. Not more than 0 5 mg of residue should be left
- 5 Resorcinol—Heat or g with or g of phthalic anhydride and of g of zinc chloride, cool, dissolve the melt in 50 ml. of water and add I ml of sodium hydroxide solution No fluorescence should be observed.
- 6 Diresorcinol.—Boil o 1 g with 2 ml of acetic anhydride, cool and layer on sulphuric acid No violet ring should appear

ANALAR

PHOSPHOMOLYBDIC ACID

Approximate formula HaPOa 12MoOa 24HaO = 2257 8

Maximum Limits of Impurities

Description -Yellow crystals or a crystalline powder

- 2 Solubility (Ammonia) —Dissolve 5 g in 50 ml of water and boil A clear solution should be produced which should remain clear on the addition of 5 ml of intrie acid.
- 3 Nitrate —Dissolve of grin to ml of water add 1 ml of standard indigo solution and 10 ml of sulphurus acid and heat to boiling. The blue colour should not entirely disappear.
- 4 Heavy Metals —Dissolve o 5 g in 40 ml of water add 1 ml of dilute hydrochlorre acid o r ml of Nyro KNinO, and heat to boiling, cool and add 0 i g of citric acid, 5 ml of dilute ammonia solution and 1 drop of sodium sulpbide solution. Any colour produced should not be deeper than the * standard colours* * defanced in appendix of
- 5 Calcium.—Dissolve i g in to ml of water add 5 ml of dilute ammonia solution and 1 ml of ammonium oxialite solution and allow to stand for 1 hour. No turbulty or precipitate should be produced.
- 6 Alkalıs Dissolve 1 g in 50 ml of boiling water and add slowly 20 ml of a 4 per cent, solution of benzidine in N/1 HCl, cool, and allow

to stand at about o' for 2 hours. Add 20 ml of a 2 per cent solution of 8-hydroxy quinoline in NI acetic acid and allow to stand at about o' overnight. Filter through a sintered glass crucible and wash twice with 20 ml portions of water containing 1 drop of NI HCl. Exporate the filtrate to 20 ml, cool and filter. Evaporate the filtrate to dryness, moisten with sulphune acid and ignite gently. Not more than 9 mg of residue should be left.

ANALAR PHOSPHORIC ACID

co 80 = 4094H

Maximum Limits of Impurities

Chloride (Cl)	o coog per cent
Sulphate (SO ₄)	0 003 per cent
Nitrate (NO _z)	o oor per cent
Lead (Pb)	0.001 per cent
Iron (Fe)	o ooz per cent
Calcium and Magnesium (Ca + Mg)	a ood per cent
Oxygen absorbed (O)	o oor per cent
Arsenic (As ₂ O ₂)	a coat per cent
	(I part per million)

- 1. Description.-A clear colourless syrupy liquid
- 2 Solubility.—Miscible in all proportions with water, and with alcohol forming clear colourless solutions
 - 3 Weight per ml. at 20° .- 1 740 to 1 750 g
- 4 Chloride —Dilute 2 ml with 50 ml of water and add 1 ml of silver nitrate solution. No opalescence should be produced
- 5 Sulphate.—Dilute 2 ml with 50 ml of water, add 2 ml of barium chloride solution and allow to stand for 2 hours. No turbidity or precipitate should be produced.

 8 Nitrato. Dilute 2 ml with 10 ml of water, add 2 ml of standard.
- 6 Nitrate.—Dilute 1 ml with 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphine acid and heat to beiling. The blue colour should not entirely disappear.
- 7 Lead.—To 4 g add 30 ml of dilute ammonia solution and 1 ml of potassium cyanide solution, dilute with water to 30 ml and add 1 drop of sodium sulphide solution. Any brown colour produced should not be deeper than that produced by the addition of 1 drop of sodium sulphide solution to 50 ml of an aqueous solution containing 2 g of the sample, 15 ml of dilute ammonia solution, 1 ml of potassium cyanide solution and 2 ml of standard lead solution [ml = 000 mg Pb]

(Continued overleaf)

PHOSPHORIC ACID—continued

- 8 Iron.—Dilute 2 ml. with water to produce 35 ml. To 5 ml of this solution add 5 ml of water, 1 ml of dilute hydrochloric acid and 1 drop of N/10 KMnO₄; mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amy lacothol and amyl acitate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard uron solution (1 ml = 000 mg. Fe) in the same manner.
- o Calcium and Magnesium —Dilute 2 ml with 10 ml of water, add 20 ml of dilute ammona solution and 5 ml of ammonium oxalate solution and heat on a water-bath for 1 hour. No turbidity or precipitate should be produced
- 10 Oxygen Absorption.—Dilute 5 ml with 20 ml of water, add 0 r ml of N/10 KMnO₄ and heat on a water-bath for 5 minutes. The pink colour should not entirely disappear.
- 11 Arsenic,-Dilute 10 g with 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0.01 mg standard stain
- 12 Assay.—Dilute 4 g with 100 ml of water and titrate with N/t NaOH to pH 4.5 using bromocresol green as indicator

Not less than 88 per cent should be indicated

AnalaR PHOSPHORUS PENTACHLORIDE

PCI₅ = 208 27

1 Description —A white to pale yellow furning deliquescent mass Decomposed violently by water forming a mixture of phosphorie and hydrochloric aeids

2 Assay.—Dissolve o r g with suitable precautions in 50 ml of N/10 NaOH, and back titrate with N/10 II₄SO₄ to pH 4.5 using bromoeresol green as indicator

Not less than 99 per cent should be indicated

To the neutralised liquid add 5 ml of nitrie acid, and 50 ml of N/10 AgNO₃, filter, wash with water and titrate the filtrate and washings with N/10 NH₄SCN using ferric ammonium sulphate as indicator

1 ml of N/10 AgNO, E o oo4165 g PCl5

Not less than 99 per cent should be indicated

ANALAR

PHOSPHOTUNGSTIC ACID

PaOs 24WOa + xHaO

Maximum Limits of Impurities

Chloride (Cl) 0 001 per cent
Nitrate (NO₂) 0 002 per cent
Ammonia (NH₂) 0 001 per cent
Alkalis (Na) 0 2 per cent

- I Description.—White or cream coloured crystals or crystalline powder
- 2 Solubility —Dissolve 1 g in 50 ml of water An almost clear and colourless solution should be produced
- 3 Chloride—Dissolve I g in 50 ml of water, filter if necessary and add I ml of dilute nitric acid and I ml of silver nitrate solution. No opalescence should be produced.
- 4 Nitrate—Dissolve 1 g in 10 ml of warm water, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling The blue colour should not entirely disappear
- 5 Ammonia—Dissolve I g in 45 ml of water and add 5 ml of sodium hydroxide solution and 2 ml of Nessler's reagent. Any yellow colour produced should not be greater than that given by the addition of 5 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 45 ml of water containing I ml of standard ammonia solution (I ml = 0 or mg NH_2)
- 6 Alkalts —Dissolve I g in 100 ml of warm water, add 0 1 ml of dulte hydrochloric acid, 0 1 ml of dulte sulphurne acid and then, with stirring I 25 g of benzidine dissolved in 3 ml of dilute hydrochloric acid and 50 ml of water. Allow to stand for 5 mmutes filter and evaporate the filtrate to dryness. To the residue add a few drops each of sulphuric acid and attric acid ignite gently moisten with sulphuric acid, reginte and weigh the residue. Not more than 6 mg should be obtained.

ANALAR PICRIC ACID (2:4:6-Trinitrophenol) C₁H₂(NO₂),0H = 220 11

Manager T.

Maximum Limits of Impurities
Sulphated Ash

Sulphated Ash or per cent
Chloride (Cl) 0005 per cent
Sulphate and Sulphonate (SO₄) 0005 per cent
Organic Impurities passes test

- Description —Pale yellow crystals Pictic acid is moistened with water before issue. The tests and specification apply to the dry substance.
 Solubility —(a) Dissolve 1 g in 100 ml of hot water and allow.
- to cool A clear yellow solution should be produced

 (b) One gram should dissolve to a clear solution in 20 ml of benzene
 - (b) One grain should dissolve to a clear solution in 20 mil of benzene
 - 3 Melting Point,--- 122° to 123°
- 4 Sulphated Ash—Ignite 1 g gently until fully charred, moisten with sulphune acid and gently reignite. Not more than 1 mg of residue should be left
- 5 Chloride.—Dissolve 2 g in 40 ml of boiling water and 1 ml of dilute nitric acid, cool and filter, to the filtrate add 10 ml of water and 1 ml of silver nitrate solution. No opalescence should be produced
- 6 Sulphate and Sulphonate—Add z g to 10 ml of nitne acid and evaporate to dryness on a water-bath Dissolve the residue in 40 ml of boiling water and z ml of dalute hydrochloric acid, cool and filter, to the filtrate add 10 ml of water and z ml of banum chloride solution and allow to stand for z hour. No tutbidity or precipitate should be produced.
- 7 Organic Impurities Dissolve 0.2 g in 20 ml of water, add 0.5 ml of sodium hydroxide solution, allow to stand for 15 munities and dilute with 30 ml of water. The colour of the resulting solution should not be deeper than that of a solution prepared by dissolving 0.4 g of the same perice acid in 50 ml of water.
- 8 Assay Dissolve 1 g in 100 ml of water and titrate with N/10 NaOH using phenol red as indicator

r ml N/10 NaOH = 0 0229 g C,H,(NO2),OH

Not less than 99 8 per cent should be indicated

ANALAR POTASSIUM BICARBONATE

KHCO2 = 100 11

Maximum Limits of Impurities

Carbonate (K ₂ CO ₃)	10 per cent
Chloride (Cl)	0 005 per cent
Sulphate (SO ₄)	0 005 per cent
Nitrate (NO ₁)	o oo2 per cent
Phosphate (PO ₄)	o oor per cent
Silicate (SiO ₁)	0 005 per cent
Heavy Metals (Pb)	o ooi per cent
Iron (Fe)	o coos per cent
Ammonia (NH ₂)	0.0005 per cent
Arsenic (As ₂ O ₂)	o coot per cent
	(I part per million)

- 1 Description -Colourless crystals or crystalline powder
- 2 Solubility—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Carbonate—The reaction of a solution of 1 g in 100 ml of carbon dioxide free water should not be greater than pH 8 5 using thymol blue as indicator
- 4 Chloride—Dissolve 2 g m 45 ml of water and add 5 ml of dilute natric acid and 1 ml of silver natrate solution Any opalescence produced should not be greater than the standard opalescence defined in appendix 2
- 5 Sulphate.—Dissolve 5 g in 100 ml of water add 12 ml of dilute hydrochloric acid and 2 ml of barium chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced
- 6 Nitrate—Dissolve 1 g in 10 ml of chlute sulphuric acid add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 7 Phosphate Dissolve 2 g m to ml of water in a platinum dish and neutralise with dilute sulphuric acid (about 3 ml) add 2 ml of acid in excess and dilute to 40 ml. To 20 ml (retain the remainder for Test No 8) add 2 ml of dilute sulphuric acid 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour defined in appendix 2.
- 8 Silicate —To 2 ml of the solution retained from Test No 7 add 20 ml of water 1 ml of dilute sulphuric acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath

(Continued overleaf)

POTASSIUM BIC IRBONATE-continued

at 60° for 10 minutes Any blue colour produced should not be deeper than the ' standard colour defined in appendix 2

- 9 Heavy Metals and Iron Dissolve 2 g in 5 ml of dilute hydrochloric acid, add 40 ml of water and 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 10 Ammonia -Dissolve 2 g in 50 ml of water, add 2 ml of hydrochloric acid, boil to remove carbon dioxide cool and add a ml of sodium hydroxide solution and 2 ml of Nessler's reagent. Any colour produced should not be greater than that given by the addition of 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 50 ml of water containing I ml of standard ammonia solution (I ml = 0 or me NH.)
- 11 Arsenic.-Dissolve 5 g in 15 ml of brominated hydrochloric acid and 45 ml of water add a few drops of stannous chloride solution and test as described in appendix 4 Any stain produced should not be greater than a 0 005 mg standard stain
- 12 Assay -Dissolve 4 g in 50 ml of water and titrate with N/1 HCl using bromophenol blue as indicator

1 ml N/1 HCl = 0 1001 g KHCO,

Not less than 99 5 per cent should be indicated

ANALAR

POTASSIUM BISULPHATE

KHSO4 = 136 17

Maximum Limits of Impurities

Chloride (Ci)	g poos per cent
Nitrate (NO ₂)	0 002 per cent
Heavy Metals (Pb)	poo2 per cent
Iron (Fe)	o ooı per cent
Ammonia (NH ₂)	o oor per cent
Arsenic (As ₃ O ₃)	o ooo1 per cent
	(1 part per million)

- 1 Description Opaque white masses
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Chloride.-Dissolve z g in 50 ml of water and add i ml of silver nitrate solution No opalescence should be produced

- 4 Nitrate—Dissolve I g in 10 ml of water, add z ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Heavy Metals and Iron—Dissolve 1 g in 45 ml of water, add 5 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 6 Ammonia —Dissolve I g in 50 ml of water and add 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent Any colour produced should not exceed that given by the addition of 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 50 ml of water containing I ml of standard ammonia solution (I ml ⇒ 00 m NH.)
- 7 Arsenic Dissolve 10 g in 50 ml of water, add 5 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than a 001 mg standard stain
- 8 Assay —Dissolve 5 g in 50 ml of water and titrate with N/1 NaOH using methyl red as indicator

t ml N/t NaOH = 0 1362 g KHSO.

Not less than 99 per cent and not more than 102 per cent should be indicated

ANALAR POTASSIUM BROMATE

KBrO. = 167 01

Maximum Limits of Impurities

Bromide (Er) 0 01 per cent
Sulphate (SO₄) 0 003 per cent
Moisture 0 1 per cent

- I Description—A white crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of hot water A clear colourless solution should be produced.
- 3 Bromide—Dissolve i g in 20 ml of water add i g of citric acid and 05 ml of chloroform—shake vigorously and allow to separate—The chloroform should not be coloured yellow or brown
- 4 Sulphate —Dissolve 2 g m 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of baruun chloride solution and allow to stand in a warm place for 1 hour. No turbidity or precipitate should be produced.
- 5 Molsture -Dry 5 g of the finely powdered material at 110° for 1 hour. The loss in weight should not exceed 5 mg

(Continued or erleaf)

POTASSIUM BROMATE-continued

6 Assay.—Dissolve or g of the dned material, obtained in Test No 5, in 25 ml of water, add 3 g of potassium iodide and io ml of dilute hydrochlone acid and iterate the liberated iodine with N/10 Na.S.O.

r ml N/ro Na₂S₂O₂ = 0.002784 g KBrO₃

Not less than 99 9 per cent should be indicated

ANALAR

POTASSIUM BROMIDE

KBr = 119 or

Maximum Limits of Impurities

Free Alkalı	o 2 ro! N/I per cen
Chloride (CI)	0 25 per cen
Bromate (BrO ₂)	o oor per cent
Iodide (I)	0 05 per cent
Sulphate (SO ₄)	0 OI per cent
Heavy Metala (Pb)	o ooz per cent
Iron (Fe)	o coos per cent
Moisture	O.C. Dec cont

- 1 Description -Colourless crystals
- 2 Solublisty -Dissolve 5 g in 50 ml. of water A clear colourless solution should be produced
- 3 Free Alkalt —Dissolve 5 g in 50 ml of carbon dioxide free water and add 0 2 ml of phenolphthalem solution. The solution should be coloutless or should not require more than 0 1 ml of N/10 HCl to render it so.
- 4. Chloride Dissolve 4 g in 75 ml of water and 25 ml of nitrie acid, boil gently and pass a current of air through the I quid until all the liberated hornine is removed. Cool add to ml of N/10 AgNO, filter wash with water and titrate the filtrate and washings with N/10 NII,SCN using ferric ammonium sulphate as indicator. Not less than 7 2 ml of N/10 NII,SCN should be required.
- 5 Bromate Dissolve I g in 10 ml of water and add I ml of dilute sulphuric acid No yellow colour should be produced
- 6 lodtde—Dissolve I g in 10 ml of water, add 0.05 ml of ferrie chloride solution and I ml of starch solution and allow to stand for 10 minutes No blue colour should be produced
- 7 Sulphate.—Dissolve I g in 50 ml of water, add I ml of dilute hydrochloric acid and I ml of barrum chloride solution and allow to stand for 2 hours. No turbidity or precipitate should be produced.

- 8 Heavy Metals and Iron—Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 3.
- 9 Moisture.—Dry 5 g of the finely powdered material at 130° for 1 hour 'The loss in weight should not exceed 25 mg
- 10 Assay.—Dissolve 0 5 g of the dired material, obtained in Test No 9, in 50 ml of water, add 50 ml of N/to AgNO3 and 10 ml of dilute nitric acid and titrate the excess of silver with N/to NH₃CN using ferric ammonium sulphate as indicator Correct the titration figure for the amount of chloride found in Test No 4

1 ml N/10 AgNO, = o-o119 g KBr

Not less than 99 per cent should be indicated

ANALAR POTASSIUM CARBONATE

$K_1CO_3 = 138 20$

Maximum Limits of Impurities

o oooi per cent
o oor per cent o ooor per cent
o ooz per cent
0 005 per cent
o ooı per cent
0 002 per cent
0 005 per cent
o oos per cent

- t Description -A hygroscopic white granular powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Chloride—Dissolve 2 g in 40 ml of water and add 10 ml of didute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 4 Sulphate Dissolve 5 g m 100 ml of water, add 20 ml of dilute hydrochloride and and 2 ml of banum chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced

POTASSIUM CARBONATF-continued

- 5 Nitrate.—Dissolve I g 10 10 ml of dilute sulphune acid, add 1 ml of standard indigo solution and 10 rol of sulphune acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Phosphate.—Dissohe 2 g in 10 ml of water in a platinum disb, neutralise with dilute sulphune and (about 5 ml), add 2 ml of and in excess and dilute to 40 ml. To 20 ml. (retain the remainder for Test No 7) add 2 ml of dilute sulphune and, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in a nenendix 2
- 7 Silicate.—To 2 ml of the solution retained from Test No 6 add 20 ml of water, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath 46 of for 10 minutes Any blue colour produced should not be deeper than the "standard colour" defined in 20 mondax 2
- 8 Heavy Metals and Iron—Dissolve I g in 3 ml of dilute hydrochlone acid, add 40 ril of water and 5 ml of dilute ammonia solution and pass hydrogen sulphude through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in a penedix 2
- 9 Ammonia Dissolve 5 g in 45 ml of water, add 8 ml of hydrochloria acid, boil to remove carbon dioxide, cool and add 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent. Any colour produced should not be greater than that given by the addition of 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 001 mg NH₂)
- To Arsenic.—Dissolve 5 g 10 50 ml of water, add 16 ml of brommated hydrochloric acid and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a coog mg standard stain
- 11 Moisture.—Dry 3 g at about 300° for 15 minutes The loss in weight should not exceed 60 mg
- 12 Assay.—Dissolve the dried material obtained in Test No 11 in 50 ml of water and titrate with N/1 HCl using bromophenol blue as indicator.

1 ml N/1 HCl \equiv 0-0691 g K₂CO₃

Not less than 99 9 per cent should be indicated

ANALAR POTASSIUM CHLORATE

KClO₂ = 122 55

Maximum Limits of Impurities

Chloride (CI)	o ooos per cent
Bromate (BrOs)	0 025 per cent
Sulphate (SO ₄)	0 005 per cent
Heavy Metals (Pb)	0 0004 per cent
Iron (Fe)	o oooz per cent
Calcium (Ca)	o oos per cent
Arsenic (As ₂ O ₂)	o occos per cent
	(o a part per million)

- z Description Colourless crystals
- 2 Solubility -- Dissolve 5 g in 50 ml of warm water A clear colourless solution should be produced
- 3 Reaction —The reaction of a solution of 1 g in 20 ml of water should be neutral to litmus paper
- 4 Chloride -Dissolve 2 g in 50 ml of water and add 1 ml of silver nitrate solution No opalescence should be produced
- 5 Bromate—Ignite 1 g and dissolve the residue in 10 ml of water, add 1 ml of dilute sulphunc and and 0 1 g of ammonium persulphate, allow to stand for 5 minutes add 2 ml of chloroform and shake No colour should appear in the chloroformic layer
- 6 Sulphate—Dissolve 2 g in 50 ml of water, add 1 ml of barium chloride solution and allow to stand for 6 hours No turbidity of precipitate should be produced.
- 7 Heavy Metals and Iron—Dissolve 5 g in 45 ml of hot water, add 5 ml of dilute animonia solution and pass livdrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- B Calcium—Dissolve 1 g in 20 ml of water add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution and allow to stand for 1 hour. No turbulty should be produced
- 9 Arsenic.—To 5 g add 20 ml of water and 22 ml of hydrochlorid acid, warm gently until chlorine ceases to be evolved cool, add 20 ml of water and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a cooz mg standard stain.
- 10 Assay Dissolve 0.3 g in 20 ml of water add 1 g of sodium nitrate and 5 ml of dilute sulphune acid, both for 3 minutes, cool add 5 ml of nitric acid and 50 ml of N/10 AgNO₂ filter, wash and tutrate (Continued overlat)

POTASSIUM CHLORATE—continued

the filtrate and washings with N/to NH₄SCN using ferric ammonium sulphate as indicator

1 ml N/10 AgNO3 - 0 01225 g LClO3

Not less than 99 5 per cent. should be indicated

ANALAR POTASSIUM CHLORIDE

KCI = 74 55

Maximum Limits of Impurities

Free Acid	o os mi n/	t per cent
Free Alksia	o os mi n/	t per cent
Sulphate (SO ₄)		per cent
Nitrate (NO.)		per cent
Heavy Metals (Ph)		per cent
Iron (Fe)		per cent
Barrum (Ba)		per cent
Calcium (Ca)		per cent
Magnesium (Mg)		
Ammonia (NH ₂)		per cent
Mosture	100 0	
Mosture	0 3	per cent

- 1 Description -Small white crystals or a crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —Dissolve 10 g in 100 ml of carbon dioude free water. The solution should be neutral to bromothymol blue or should not require more than 0 05 ml of N/10 NaOH or N/10 HCl to render it so.
- 4 Sulphate—Dissolve 5 g in 50 ml of water add 1 ml of dilute hydrochlorie acid and 1 ml of barium chloride solution and allow to stand for 24 hours. No turbidity or precipitate should be produced
- 5 Nitrate.—Dissolve 1 g in 10 ml of water add 1 ml of standard indigo solution and 10 ml of sulphume acid and heat to boil ng 'The blue colour should not entirely disappear
- 6 Heavy Metals and Iron.—Dissolve 2 g in 45 ml of water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours? defined in appendix 2
- 7 Barium Dissolve 5 g in 50 ml of water add 1 ml of dilute sulphure reid and allow to stand for 2 hours. No turbidity or precipitate should be produced.

- 8 Calcium Dissolve 2 g in 20 ml, of water add 2 ml of dilute ammonia solution and 2 ml of ammonium osalate solution and allow to stand for 2 hours. No turbudity or precapitate should be produced.
- o Magnesium —Dissolve 2 g m 10 ml of water, add 5 ml of dulute ammonia solution and 5 ml of ammonium phosphate solution and allow to stand for 2 hours produced
- 10 Ammonia Dissolve 1 g in 50 ml of water and add 2 ml of Nessler's reagent Any colour produced should not exceed that given by the addition of 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 of mg NH₃)
- 11 Moisture.—Dry 5 g of the finely powdered material for 1 hour at 150° The loss in weight should not exceed 15 mg
- 12 Assay —Dissolve 0.3 g of the dried material from Test No. 11 in 50 ml of water and titrate with N/10 AgNO₃ using potassium chromate as indicator

1 ml Nito AgNO, = 0 007455 g KCl

Not less than 99 8 per cent should be indicated

** ***

ANALAR POTASSIUM CHROMATE

K,CrO, = 104 20

Maximum Limits of Imputities

Free Alkali	bazzez rezt	
Chloride (Cl)	o-cot per cent	
Sulphate (SO ₄)	oron per cent	
Aluminium (Al)	n nog per cent	
Calcum (Ca)	0.005 per tent	

- 1 Description —Lemon yellow crystals or crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear yellow solution should be produced
- 3 Free Alkalı Dissolve I g in 25 ml of carbon dioxide free water and add 0 5 ml of thymolphthalein solution No change in colour should be produced
- 4 Chloride Dissolve I g in 45 ml of water and add 5 ml of nutric acid and 0 5 ml of silver nutrate solution. No opalescence should be produced.
- 5 Sulphate —Dissolve I g in 50 ml of water add 3 ml of dilute hydrochloric acid and 0.5 ml of bismm chloride solution and allow to stand for 2 hours. No turbidity or precipitate should be produced.

(Continued overleaf)

POTASSIUM CHROMATF-continued

- 6 Aluminium and Calcium.—Dissolve 2 g in 40 ml of water, add 5 ml of dilute ammonia solution and 5 ml of ammonium oxilate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced
- 7 Assay.—Dissolve 0.3 g in 100 ml of water, add 2 g of potassium iodide and 20 ml of dilute hydrochlone acid and titrate the liberated iodine with N/10 Na₂S₂O₃ using starch solution as indicator

1 ml N/10 Na2S2O3 = 0-006473 g K2CrO4

Not less than 99 per cent should be indicated

Organic Impurities

ANALAR

POTASSIUM CITRATE

K.C.H.O. H.O = 124 40

Maximum Limits of Impurities

Free Acid	1 o ml N/1 per cent
Free Alkah	toml N/t per cent
Chloride (CI)	o oos per cent
Sulphate (SO ₄)	ooi per cent
Heavy Metals (Pb)	0 coz per cent
Iron (Fe)	o our per cent
Reducing Substances	Dasses test

passes test

- 1. Description -Small white crystals or a crystalline powder
- 2 Solubility -- Dissolve 5 g in 50 ml of water. A clear colouriess solution should be produced.
- 3 Reaction —Boil 5 g with 50 ml of water and cool. The solution should be neutral to thymol blue or should not require more than 0 s ml of N10 N20H or N10 HCl to render it so
- 4 Chloride—Dissolve 2 g in 45 ml of water and sdd 5 ml of dlute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the 'standard opalescence "defined in appendix 2
- 5 Sulphate.—Dissolve 1 g m 50 ml of water, add 3 ml of dulute hydrochloric acid and 1 ml of banum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 1 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2

- 7 Reducing Substances.—Dissolve to g in 50 ml of hot water, add 4 g of anhydrous sodium carbonate and 10 ml of cupric sulphate solution and boil for 5 minutes No turbidity or precipitate should be produced.
- 8 Organic impurities—Heat 2 g with 10 ml of sulphuric acid in a boiling water-bath for 1 hour. Not more than a pale yellow colour should be produced
- 9 Assay.—Ignite gently 4 g in a platinum dish until decomposition is complete. Boil the residue with 100 ml of water and 50 ml of N/1 H₂SO₄, filter and wash with water. Titrate the filtrate and washings with N/1 NaOH using methyl red as indicator.

1 ml N/1 H2SO4 = 0 1081 g K3C6H5O7.H2O

Not less than 99 per cent should be indicated

ANALAR

POTASSIUM CYANIDE

KCN = 65 11

Maximum Limits of Impurities

Chloride (CI)	05 per cent
Sulphate (SO ₄)	oor percent
Sulphide	no reaction
Ferrocyanide (Fe(CN).)	0 005 per cent
Thiocyanate (SCN)	oor percent
Heavy Metals (Pb)	o ooi per cent
Heavy Metals (Cu)	o oot per cent
Sodrum	no reaction

- 1 Description -A white crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water, a clear colourless solution should be produced. Five grams should dissolve in 25 ml of hot 60 per cent alcohol
- 3 Chloride,—Dissolve I g in go ml of water, add 25 ml of formaldehyde solution, 5 ml of intine acid and 10 ml of N/10 AgNO₂, filter, wash with water and ititate the filtrate and washings with N/10 NH,SCN using ferric ammonium sulphate as indicator. Not less than 8 6 ml of N/10 NH,SCN should be required.
- 4 Sulphate—Dissolve x g in 50 ml of water, add 5 ml of dilute hydrochloric acid, boil gently for 5 minutes cool, add x ml of barnum chloride solution and allow to stand for x hour No turbidity or precipitate should be produced

(Continued overleaf)

POTASSIUM CLANIDE-continued

- 5 Sulphide —Dissolve r g in 20 ml of water and add 5 ml of dilute ammonia solution and r drop of potassium plumbite solution. The solution should not darken in colour
- 6 Ferrocyanide and Thiocyanate.—Dissolve x g in 25 ml of water add 5 ml of dilute hydrochloric acid and x drop of ferric chloride solution and allow to stand for 10 minutes No blue or red colour should be produced
- 7 Heavy Metals —Dissolve I g m 50 ml of water and pass hydrogen sulphide through the solution for a few seconds. No brown colour should be produced nor should any appear on the further addition of 5 ml of dilute hydrochloric acid
- 8 Sodium —Heat a little of the salt on platinum wire in a Bunsen flame. Not more than a transient yellow flame should be produced
- 9 Assay —Dissolve o 5 g in 50 ml of water add 5 ml of dilute ammona solution and 1 drop of potassium todide solution and titrate with N/10 AgNO₂ until a faint permanent turbidity ampears

1 ml N/10 AgNO3 = 0-01302 g KCN

Not less than 96 per cent should be indicated

ANALAR

POTASSIUM DICHROMATE

K,Cr,O, = 294 21

Maximum I units of Impurities

Chloride (Cl) 00005 per cent
Sulphate (SO₄) 001 per cent
Aluminium (Al) 0003 per cent
Calcium (Ca) 0005 per cent
Sodium po reaction
Mosture 005 per cent

- Description.—Orange red crystals or crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of water A clear orange red solution should be produced.
- 3 Chloride Dissolve 2 g in 45 ml of water and add 5 ml of infute nitric acid and 0 5 ml of silver nutrate solution. No opalescence should be produced
- 4 Sulphate Dissolve 2 g in 45 ml of water add 7 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 6 hours No turbidity or precipitate should be produced
- 5 Aluminium and Calcium Dissolve 2 g in 40 ml of water, add 5 ml of dilute ammonin solution and 5 ml of ammonium ovalate

solution and allow to stand for 2 hours No turbidity or precipitate should be produced

- 6 Sodium.—Moisten a little of the powdered salt with hydrochloric acid and heat in a flame on a platinum wire. No yellow flame should be produced
- 7 Moisture.—Dry 10 g for 1 hour at 120° The loss in weight should not exceed 5 mg
- 8 Assay.—Dissolve 0.2 g of the dried material from Test No. 7 in 100 ml of water, add 2 g of potassium iodide and 20 ml of dilute hydrochloric acid and titrate the liberated iodine with N/10 Na₂S₂O₃ using starch solution as indicator

1 ml N/10 Na₂S₂O₃ ≡ 0 004904 g K₂Cr₂O₇

Not less than 99 9 per cent should be indicated

ANALAR

POTASSIUM DIHYDROGEN PHOSPHATE

 $KH_{1}PO_{4} = 13609$

Maximum Limits of Impurities

Reaction	pH 4 5
Chloride (Ci)	o coos per cent
Sulphate (SO.)	o of per cent
Lead (Pb)	o ooi per cent
Iron (Fe)	0 002 per cent
Ammonia (NH ₃)	0 005 per cent
Moisture	O t per cent

- Description.—A white crystalline powder
- z Solubility.—Dissolve z g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction.—The reaction of a solution of 1 g in too ml of carbon dioxide-free water should be pH 4 5 using bromocresol green as indicator
- 4 Chloride Dissolve 2 g in 50 ml of water and add 2 ml of dilute nitric and and 1 ml of silver nitrate solution. No opalescence should be produced
- 5 Sulphate Dissolve 25 g in 50 ml of water, add 1 ml of ddute hydrochloric acid and 2 ml of barum chloride solution and allow to stand for 2 hours No turbulsty or precipitate should be produced
- 6 Lead.—Dissolve 7 g in 30 ml of hot water and 15 ml of dilute ammonia solution, add 1 ml of potassium cyanide solution, dilute with

(Continued overleaf)

POT 4SSIUM DIHYDROGEN PHOSPHATE-continued

water to 50 ml and add 2 drops of sodium sulphide solution. Any brown colour produced should not be deeper than that produced by the addition of 2 drops of sodium sulphide solution to 50 ml of an aqueous solution containing 2 g of the sample, 15 ml of dilute ammonia solution, 1 ml of potassium cyanide solution and 5 ml of standard lead solution (1 ml = 0 or mg Pb)

- 7 fron Dissolve 1 g in 8 ml of water and add 4 ml of dilute hydrochloric acid and 1 drop of N/10 KMnO4, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 2 ml of standard iron solution (1 ml = 0 or mg Fe) in the same manner.
- 8 Ammonia Dissolve o 2 g in 40 ml of water add 2 ml of sodium hydroxide solution and 1 ml Nessler reagent. Any yellow colour produced should not exceed that given by 1 ml of standard ammonia solution (1 ml = 0 or mg NH₂) in an equal volume of solution containing the quantities of reagents used in the test.
- 9 Moisture Dry 5 g at 110° for 1 bour The loss in weight should not exceed 5 mg
- 10 Assay Dissolve the dried material from Test No 9 in 100 ml of water and titrate with Nf1 NaOH to pH 92 using thymol blue as indicator

1 ml N/1 NaOH = 0 1361 g KH.PO.

Not less than 99 5 per cent should be indicated

ANALAR

POTASSIUM FERRICYANIDE

K.Fe(CN) = 320 25

Maximum Limits of Impurities

Chloride (Cl) 0 02 per cent
Sulphate (SO4) 0 005 per cent
Ferrocyanide (Fe(CN)4) 0 005 per cent

Description —Ruby red crystals

2 Solubility -- Dissolve 5 g in 50 ml of water A clear yellow green solution should be produced

3 Chloride — Dissolve I g in 85 ml of water add i s ml of cupric sulphate solution and filter. To 50 ml of the filtrate add i ml of dilute intre acid and I ml of silver intrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2

- 4 Sulphate.—Dissolve 2 g m 50 ml of water, add 1 ml of diffuce hydrochloric acid and 1 ml of barrum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 5 Ferrocyanide.—Rapidly wash I g with water, then dissolve in 100 ml of water and add I drop of ferrie ammonium sulphate solution No blue colour should be produced.
- 6 Assay.—Dissolve 1 g in 50 ml of water, add 2 g of potassium iodide, 3 g of zinc sulphate and 1 ml of dilute hydrochloric acid, and utrate the liberated iodine with N_{10} N_{2} S_{2} O_{3}

1 ml N/10 Na₂S₂O₃ = 0.03293 g K₂Fe(CN)₆

Not less than 99 per cent should be indicated

ANALAR POTASSIUM FERROCYANIDE

K4Fe(CN), 3H4O = 422 39

Maximum Limits of Impurities

Chloride (CI) Sulphate (SO₄) o o2 per cent o oo5 per cent

- z Description —Pale yellow crystals or crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear yellow solution should be produced
- 3 Chloride.—Dissolve I g m 85 ml of water, add 15 ml of cupric sulphate solution and filter. To 50 ml of the filtrate add 1 ml of distinct acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2.
- 4 Sulphate Dissolve 2 g in 50 ml of water, add 1 ml of dilute hydrochloric and and 1 ml of barnum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 5 Assay.—Dissolve 1 g in 400 ml of water, add 10 ml of sulphuric acid and titrate with N/10 KMnO $_4$

1 ml N/10 KMnO4 = 0 04224 g K4Fe(CN)6 3H2O

Not less than 99 per cent should be indicated.

ANALAR

POTASSIUM HYDROGEN PHTHALATE

COOH C.H. COOK = 204 22

Maximum Limits of Impurities

Reaction of a M/20 solution	pn 3 96 to 3 9
Chloride (Cl)	0 oot per cent
Sulphate (SO ₄) Heavy Metals (Pb)	o oi per cent
	o ooz per cent
Iron (Fe)	0 001 per cent
Moisture	o r per cent

- 1 Description.-A white crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of hot water A clear colourless solution should be produced
- 3 Reaction *—The pH of an M/20 solution in carbon dioxide free water at 20° should like between 3 96 and 3 98, the determination being made electrometrically by immersing a freshly ignited plantum electrode in a portion of the solution which has been saturated with quanhydrone and combining this element with a saturated caloniel half cell by means of an agar bridge saturated with potassium chloride. If the E M F of this cell is E millivolis

pH of solution at $20^{\circ} = \frac{453 \ 3 - E}{58 \ 10}$

- 4. Chloride.—Dissolve I g in 20 ml of warm water and 2 ml of dilute mitre acid, cool, filter and to the filtrate add 30 ml of water and 1 ml of silver intrate solution. No opalescence should be produced.
- 5 Sulphate.—Dissolve I g m 20 ml of warm water and 2 ml of dilute hydrochloric acid, cool, filter, and to the filtrate add 30 ml of water and 1 ml. of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron.—Dissolve 1 g in 40 ml of water, add 10 ml of dilute arumonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Moisture -- Dry 10 g at 110° for 1 hour The loss in weight should not exceed 10 mg
- *The provisions concerning the pff of the solution of Potassium Historgen Linksher AralaR will automatically be revised if necessary to comply with the forthcoming limith Standard Specification dealing with pff standards, es soon as that Specification is published

8 Assay.—Dissolve 9 g of the dried material from Test No 7 in 100 ml. of water and titrate with N/1 NaOH using phenolphthalein as indicator

1 ml N/t NaOH = 0 2042 g COOH CaH4 COOK

Not less than 99 9 per cent and not more than 100 1 per cent should be indicated

ANALAR

POTASSIUM HYDROGEN TARTRATE

KHC,H,O, = 188 18

Maximum Limits of Impurities

Chlonde (CI)	o oor per cent
Sulphate (SO ₄)	oot per cent
Heavy Metals (Pb)	o ooz per cent
Iron (Fe)	o oor per cent
Mouthire	O T THE CARE

- 1 Description .- A white crystalline powder
- 2 Solubility.—Dissolve 1 g in 50 ml of warm water A clear colourless solution should be produced
- 3 Chloride.—Dissolve I g in 50 ml of water and 2 ml of dilute nutric acid and add I ml of silver nutrate solution. No opalescence should be produced.
- 4 Sulphate—Dissolve 1 g in 50 ml of water and 2 ml of dilute hydrochioric and, add 1 ml of barum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 5 Heavy Metals and Iron.—Dissolve 1 g in 40 ml of water and 10 ml of didte ammonia solution and pass hydrogen sulphide through the solution for a few s-conds. Any colour produced should not be deeper than the "standard colours" defined in approxim 2
- 6 Moisture.—Dry 10 g at 110° for 1 hour The loss in weight should not exceed 10 mg
- 7. Assay.—Suspend 8 g of the dried material from Test No 6 in 200 ml of hot water and titrate with N/I NaOH using phenolphthalein as indicator and boiling well towards the end of the titration

1 ml N/1 NaOH = 0 1882 g KHC4H4O4

Not less than 99 9 per cent should be indicated.

ANALAR POTASSIUM HYDROXIDE

KOH = 56 10

Maximum Limits of Impurities

Chloride (CI)	o or per cent
Sulphate (SO ₄)	0 005 per cent
Nitrate (NO ₃)	0 002 per cent
Phosphate (PO.)	o oor per cent
Silicate (SiO ₂)	o or per cent
Heavy Metals (Pb)	0 002 per cent
Iron (Fe)	o oor per cent
Aluminium (Al)	0.005 per cent
Zinc (Zn)	0 002 per cent
Ammonia (NH ₃)	o oot per cent
Arsenic (As ₁ O ₃)	o coor per cent
Carbonate (K ₂ CO ₄)	(t part per million)
Carbonate (121001)	20 per cent

1 Description .- White deliquescent sticks or pellets

2 Insoluble Matter... Dissolve 50 g, accurately weighed, in water, cool and dilute to 500 ml using carbon dioxide free water throughout Not more than a very small amount of insoluble matter should be visible. This solution is referred to set be "sample solution." In the property of the set of the solution of the set o

This solution is referred to as the "sample solution" in the remaining clauses of this specification

- 3 Chloride.—Dilute 10 ml of the sample solution with 35 ml of water and add 5 ml of dilute nitric acid and 1 ml of silver nitrate solution Any opalescence produced should not exceed the "standard opalescence" defined in appendix 2
- 4 Sulphate —To 50 ml of the sample solution add 17 ml of dilute hydrochloric acid and 2 ml of barium chloride solution and allow to stand for 1 hour. No turbulty or precipitate should be produced.
- 5 Nitrate —To 10 ml of the sample solution add cautiously 1 ml of sulphuric acid, cool, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Phosphate Dissolve 2 g in 20 ml of water in a plannum dish, neutralise with dilute sulphurie acid (about 6 ml), add 2 ml of acid in excess and dilute to 40 ml. To 20 ml (retain the remainder for Test No 7) add 2 ml of dilute sulphurie acid, ml of phosphate regent No 1 and 1 ml of phosphate regent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in appendix 2

- 7. Silicate.—To 1 ml of the solution retained from Test No 6 add coml of water, 1 ml of dilute sulphuric acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour," defined in appendix 2
- 8 Heavy Metals and Iron.—To 10 ml of the sample solution add 5 ml of dilute hydrochloric acid, 10 ml of dilute ammonia solution and 25 ml of water and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 9 Aluminium.—To 10 ml of the sample solution add 10 ml of dilute actic acid and 1 ml of a 0 per cent aqueous solution of ammonium aurine-tricarboxylate ("alumnion"), allow to stand for 5 minutes and then add 10 ml of ammonium carbonate solution. Any pink colour produced should not be deeper than that of a solution prepared in the following manner. To 15 ml of water add 0 5 ml of standard iluminium solution (I ml = 0 1 mg All), it of ammonium acetate, 5 ml of dilute acetic acid, 1 ml of "aluminion" solution, and after a lapse of 5 minutes, 10 ml of ammonium carbonate solution.
- 10 Zinc.—Neutralise 20 ml of the sample solution with dilute sulphure and (about 6 ml), add 1 drop in excess, and cool Add 1 drop of ammonium thiocyanate solution and 02 ml of a 0.5 per cent alcoholic solution of p-dimethylaminostyn) β-naphthiazole methyl indide The colour produced immediately should not be pink when compared with a solution containing 25 ml of water, 1 drop of dilute sulphure and, 1 drop of ammonium thiocyanate solution and 02 ml of the reagent solution.

Alternatively the following polarographic procedure may be employed—Dissolve rog in 50 ml of water, de-oxygenate, and polarograph over the range—09 volt to—14 volt. Return the solution in the polarographic cell, together with the mercury, to the solution under test add o 2 ml of standard zine solution ($ml = r mg Z n_l$) mix well and polarograph as before. The wave height obtained in the first experiment should not be greater than the increase in height obtained in the second experiment

- 11 Ammonia.—Diute 10 ml of the sample solution with 40 ml of water and add 2 ml of Nessler's reagent Any colour produced should not exceed that given by the addition of 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 00 rm g NH₂).
- 12 Arsenic.—To 50 ml of the sample solution add 18 ml of bromunated hydrochlone and and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a 0 005 mg standard stain.
- 13 Assay and Carbonate.—To 25 ml of the sample solution add 2 ml of battum chloride solution and titrate with N/1 HCl using phenol-phthalein as indicator

POTASSIUM HYDROXIDF-continued

Then add bromophenol blue and continue the titration with N/I HCl

I ml N/I HCl = 0 o6gI g K.CO.

Not less than 85 per cent of KOH, and not more than 2 per cent of K2CO2 should be indicated

ANALAR POTASSIUM IODATE

KIO, = 214 02

Maximum Limits of Impurities

 Chlorate (ClO₂)
 DOS
 per cent

 Iod:de (I)
 0 001 per cent

 Sulphate (SO₄)
 0 05 per cent

 Moisture
 D I
 per cent

- I Description -A white crystalline powder
- 2 Solubility —Dissolve 5 g in 50 ml of warm water A clear coloutless solution should be produced.
- 3 Reaction -Dissolve r g in 20 ml of water The solution should be neutral to firmus
- 4 Chlorate —Dissolve of g m 25 ml of water, add 5 ml of dulter attres and and 15 ml of eulere natures solution shake well and filter. To the filtrate add 10 ml of formaldchyde solution boil for 2 minutes and cool. Any opidisecence produced should not exceed that given by 1 ml of standard chlorade solution (1 ml = 0 t mg Cl) with 35 ml of water when treated with 5 ml of dilute nature acid, 5 ml of silver intrate solution and 10 ml of formaldchyde solution and boiled for 2 minutes
- 5 lodde —Dissolve i g in 20 ml of water, add i g of citric acid and o 5 ml of chloroform, shake rigorously and allow to separate. The chloroform should not be coloured pink or volet.
- 6 Sulphate —Dissolve 1g in 50 ml of water, add 0 6g of hydroxylamine hydrochlonde and boil until free rodine is removed, cool, dilute to 50 ml, add 0.5 ml of dilute hydrochloric send and 1 ml of hanum chloride solution and allow to stand for 15 minutes

 No turbidity or precipitate should be produced
- 7 Moisture -Dry 5 g of the finely powdered material at 110° for 1 hour. The loss in weight should not exceed 5 mg
- 8 Assay Dissolve 0.15 g of the dried material obtained in Test No. 7 in 50 ml of water, add 3 g of potassium rodide and 10 ml of dilute hydrochlone acid and nitrate the liberated iodine with N/10 Na₂S₂O₃

1 ml N/10 Na₂S₂O₃ \equiv 0 003567 g KIO₃

Not less than 99 9 per cent should be indicated

ANALAR POTASSIUM IODIDE

KI == 166.02

Maximum Limits of Impurities

Free Alkalı	o 2 ml N/1 per cent
Chloride and Bromide (Cl)	o o25 per cent
Iodate (IO ₂)	o ooo3 per cent
Sulphate (SO4)	o oos per cent
Heavy Metals (Pb)	0.001 per cent
Iron (Fe)	0 0005 per cent
Moisture	o 5 per cent

- 1 Description .- Colourless crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Free Alkalı.—Dissolve 5 g in 50 ml of carbon dioxide-free water and add 0.2 ml of phenolphthalein solution. The solution should be coloutless or should not require more than 0.1 ml of N/10 HCl to render it so
- 4 Chloride and Bromide.—Dissolve 0.4 g in 5 ml of dilute ammonia solution, add 30 ml of N/so AgNO₂ and 5 ml of water and shake well Filter, and so the filtrate add 10 ml of dilute nitric and Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 5 lodate Dissolve 1 g in 20 ml of water and add 1 g of citne acid and 1 ml. of starch solution. No blue colour should be produced
- 6 Sulphate —Dissolve z g in 50 ml of water, add i ml of dilute hydrochloric acid and i ml of barium chloride solution and allow to stand for i hour. No turbidity or precipitate should be produced
- 7 Heavy Metals and Iron.—Dissolve 2 g m 45 ml of water, add 5 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Moisture.—Dry 5 g of the finely powdered material at 120° for 1 hour. The loss in weight should not exceed 25 mg
- 9 Assay.—Dassolve of g of the dried material, obtained in Test No 8, in 25 in 1 of water, add 20 ml of dulue hydrochloric acid and 5 ml of potassium cyanide solution and citrate with M/20 K1O₂ until the dark brown solution which is formed becomes light brown, then add 5 ml of starch solution and continue the tirration until the blue colour disappears

1 ml M/20 KlO₂ ≅ 0-0166 g Kl

Not less than 99 5 per cent should be indicated

POTASSIUM METABISULPHITE

K,S,O, = 222 12

Maximum Limits of Impurities

Chloride (CI)	0 02 per cent
Heavy Metals (Pb)	o co2 per cent
Iron (Fe)	o oot per cent
Arsense (As ₂ O ₂)	o 00002 per cent
	(o 2 part per million)

- 1. Description.-Colourless crystals or a white powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colouriess solution should be produced
- 3 Chloride.—Dissolve o 5 g in 5 ml of dilute nitrio acid and warm until decomposition sets in When the reaction has moderated, cool and add 45 ml of water and 1 ml of salver natrate solution. Any opalescence produced should not be greater than the "standard opalescence" described in appendix 2
- 4 Heavy Metals and Iron—Dissolve 1 g in 40 ml of water, add to ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any solour produced should not be deeper than the "standard colours" defined in appendix 2
- 5 Arsenic.—To 5 g add 10 ml of water, 3 g of poissium chlorate and 20 ml of hydrochloric and, when the reaction has ceased, holf gently to remove chlorine, add 40 ml of water and a few drope as stanosist chloride solution and test as described in appendix 4. Any stain produced should not be greater than a o oor mg standard stain
- 6 Assay.—Dissolve 0.2 g in 50 ml of N/10 I and titrate the excess of judge with N/10 Na.S.O.

1 ml N/10 I ≡ 0 005558 g K2S2O5

Not less than 96 per cent should be indicated

POTASSIUM NITRATE

KNO, = 101 10

Maximum Limits of Impurities

Free Acid	o os mi n/1 per cent
Free Alkalı	o os mi N/1 per cent
Chlonde (CI)	o ooos per cent
Iodate (IO ₂)	o occos per cent
Sulphate (SO ₄)	0 005 per cent
Nitrite (NO ₂)	o coor per cent
Phosphate (PO ₄)	o con per cent
Heavy Metals (Pb)	0 0004 per cent
Iron (Fe)	o coo2 per cent

1 Description —Colourless crystals

- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced.
- 3 Reaction.—Dissolve 10 g in 100 ml of carbon dioxide free water. The solution should be neutral to bromothymol blue or should not require more than 0 05 ml of N/10 NaOH or N/10 HCl to render it so
- 4 Chloride.—Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 5 Sulphate —Dissolve 2 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barrum chloride solution and allow to stand for 6 hours No turbulity or precipitate should be produced
- 6 Nitrite and Iodate—Dissolve 1 g in 10 ml of water add 1 ml of dilute sulphune acid 1 ml of starch solution and 1 ml of cadmum odde solution and allow to stand for 1 munute No blue colour should be produced
- 7 Phosphate Dusolve 1 g m 20 ml of water add 3 ml of diduct sulphure acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour defined in appendix 2
- 8 Heavy Metals and Iron.—Dissolve 5 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2

POTASSIUM OXALATE

(COOK), H.O = 184 22

Maximum Limits of Impurities

Reaction	∌н 7 о to 8 о
Chloride (CI)	0 0005 per cent
Sulphate (SO ₄)	ooi per cent
Nitrate (NO ₁)	0 002 per cent
Heavy Metals (Pb)	o ooz per cent
Iron (Fe)	0 001 per cent

- 1 Description -Colourless crystals
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—The reaction of a solution of 1 g in 40 ml of carbon dioxide free water should lie between the limits of pH 70 and 80 using phenol red as indicator
- 4. Chloride—Dissolve 2 g in 45 ml of warm water and add 5 ml of dilute nitric acid and 0 i ml of silver nitrate solution. No opalescence should be produced.
- 5 Sulphate —Ignite 1 g under conditions that well not introduce sulphur Dissolve the residue in 1 m of hot water add 5 ml of hydrogen peroxide (20 volumes) boil cool add 4 ml of dlute hydrochione sed and filter. To the filtrate add 50 ml of water and 2 ml of barnum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 6 Nitrate—Dissolve r g in 10 ml of water add r ml of standard indigo solution and ro ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.
- 7 Heavy Metals and Iron—Dissolve I g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the 'standard colours' defined in appendix 2
- 8 Assay —Dissolve 0.3 g in 50 ml of hot water add 5 ml of sulphuric acid and titrate with N/10 KMnO4 at a temperature of about 60°

1 ml N/10 kMnO, = 0-000211 g (COOk), H2O

Not less than 99 per eent should be indicated

ANALAR POTASSIUM PERIODATE

LIO, = 230 03

Maximum Limits of Impurities

Chlorate Chlorade Bromide	(CI) 0 01	per cent
Iodide (I)	100 0	per cent
Sulphate (SO ₄)	0 01	per cent
Manganese (Mn)	0 0003	per cent
Moisture	c 1	per cent

- I Description —A white crystalline powder
- 2 Solubility Very sparingly soluble in cold water Dissolve i g in 50 ml of hot water a clear colourless solution should be obtained
- 3 Chlorate, Chloride, Bromide.—Dissolve x g in 50 ml of water and z ml of intire acid add o x g of sodium nitrite and x ml of silver nitrate solution and allow to stand for 5 minutes. Any opales cence produced should not be greater than the standard opalescence defined in appendix 2
- 4 lodide.—Dissolve 1 g m 40 ml of water and 10 ml of dilute sulphuric acid shake vigorously with 0 5 ml of chloroform and allow to separate The chloroform should not be coloured pink or violet
- 5 Manganese—Boil 1 g with 25 ml of water and 10 ml of sulphuric acid and allow to stand for 5 minutes No pink colour should be produced
- 6 Moisture —Dry 5 g at 110° for 1 hour The loss in weight should not exceed 5 mg
- 7 Assay —Dissolve o 5 g in 100 ml of water add 3 g of sodium bicarbonate and 3 g of potassium iodide and titrate the liberated iodine with N/10 Na₃AsO₄

1 ml N/10 Na,AsO, = 0-0115 g KIO,

Not less than 99 7 per cent should be indicated

ANALAR

POTASSIUM PERMANGANATE

KMnO. = 158 03

Maximum Limits of Impurities

Insoluble Matter	or percent
Chloride (CI)	o or per cent
Sulphate (SO ₄)	o or per cent
Nitrate (NO ₂)	o o8 per cent

(Continued overleaf)

POTASSIUM PERMANGANATE—continued

- 1 Description -Black or dark purple crystals with a metallic lustre
- 2 Solubility.—Soluble in water forming a deep purple solution Dissolve 10 g in 200 ml of water filter through a Gooch crucible, wash with water dry and weigh Not more than 10 mg of residue should be obtained
- 3 Chloride.—Dissolve 1 g in 35 ml of water and add this solution slowly to a mixture of 10 ml of hydrogen peroxide (20 volumes) and 7 ml of dilute nitra eard, then add 1 ml of silver nitrate solution. Any opakes cence produced should not be greater than the standard opalescence "defined in appendix 2
- 4 Sulphate —Dassolve 1 g m 35 ml of water and add this solution slowly to a mixture of 10 ml of hydrogen peroxide (20 volumes) and 7 ml of dilute hydrochloric acid, then add 1 ml of barrum, chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 5 Nitrate—Dissolve o 1 g in 10 ml of dilute sulphuric acid heat to 60° and add, in small portions at a time 0 5 g of oxalic acid Cool, add 4 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear
- 6 Assay —Dissolve o i g in 50 ml of water add 3 g of potassium iodide and 10 ml of dilute sulphuric acid and titrate the liberated iodine with N/10 Nai-S₁O₄

1 ml N/10 Na2S.O3 = 0 00316 g LMnO4

Not less than 99 5 per cent should be indicated

AnalaR

POTASSIUM PERSULPHATE

 $L_3S_2O_6 = 270\ 32$

	(r part per million)
Arsenic (As,O.)	o coo1 per cent
Ammonia (NH ₂)	o ooı per cent
Manganese (Mn)	o ooo2 per cent
Iron (Fe)	o ooi per cent
Heavy Metals (Pb)	o ooz per cent
Chloride (Cl)	0 005 per cent

- Description —A white crystalline powder
- 2 Solubility -- Dissolve 5 g in 50 ml of hot water A clear colourless solution should be produced
- 3 Chloride —Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 0.2 ml of silver nitrate solution Any opalescence

produced should not be greater than the "standard opalescence" defined in appendix 2

- 4 Heavy Metals and Iron—Boil 1 g with 10 ml of dilute hydro-chloric acid until reduced to 5 ml., cool, add 30 ml of water and 15 ml of dilute ammona solution and poss hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2.
- 5 Manganese.—Dissolve 2 g in a mixture of 10 ml of dilute sulphuric acid, 10 ml of dilute ammonia solution 3 ml. of dilute nutric acid and 1 ml of silver nutrate solution previously heated to 90°, keep at that temperature for 1 minute and then cool rapidly. No pink colour should be produced.
- 6 Ammonia.—Dissolve 1 g in 50 ml of water and add 2 ml of Nessler's reagent. Any colour produced should not exceed that given by the addition of 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 001 mg NH_3)
- 7 Arsenic.—Mix 5 g with 15 ml of hydrochloric acid and boil gently to remove free chlorine, dilute with 50 ml of water, add a few drops of stannous chloride solution and test as described in appendix 4 Any stain produced should not be greater than a 0 005 mg standard stain
- 8 Assay.—Dissolve 0.5 g of the finely powdered material in a solution of 0.5 g of ferrous sulphate, 3 g of potassium iodide, 25 ml of dilute sulphuric acid and 25 ml of water, allow to stand for 30 minutes and titrate the liberated iodine with N/10 Na₂S₂O₃ Carry out a blank titration without the persulphate and make the necessary correction

1 ml N/10 Na₂S₂O₃ ≡ 0 01352 g K₂S₂O₈

Not less than 98 per cent should be indicated

ANALAR POTASSIUM SULPHATE

K,SO, = 174 26

Free Acid	o os ml N/1 per cent
Free Alkalı	o os mi N/I per cent
Chloride (Cl)	o coos per cent
Nitrate (NO ₃)	o ooz per cent
Heavy Metals (Pb)	o oor per cent
Iron (Fe)	0 0005 per cent
Calcium (Ca)	0 005 per cent
Magnesium (Mg)	o of per cent
Ammonia (NH ₂)	a oor per cent
	(Continued overleaf)

POT ASSIUM SULPHATE-cont nued

- 1 Description -- Colourless crystals
- 2 Solubility -Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction.—Dissolve 10 g in 100 ml of carbon dioxide free water. The solution should be neutral to bromothymol blue or should not require more than 0.0 ml of N/10 NOIH or N/10 HCl to render it so
- 4 Chloride.—Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution No opalescence should be produced.
- s Nitrate -- Dissolve i g m 10 ml of water add i ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Heavy Metals and Iron.—Dissolve 2 g in 45 ml of water add 5 ml of dulute amnonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours.
- 7 Calcium—Dissolve 2 g in 40 ml of water add 5 ml of dilute ammonia solution and 5 ml of ammonium oxalate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced.
- 8 Magnesium Dissolve 2 g in 40 ml of water add 5 ml of dilute ammonia solution and 5 ml of ammonium phosphate solution and allow to stand for 2 hours. No turbidity or precipitate should be produced.
- 9 Ammonia Dissolve 1 g in 50 ml of water and add 2 ml of Nessler 8 reagent. Any colour produced should not exceed that given by the addition of 2 ml of Nessler 8 reagent to 50 ml of water containing 1 ml of standard ammonia solut on (1 ml 00 mg NH).

Analar

POTASSIUM TETROXALATE

 $KH_1(C_1O_4)_1 2H_1O = 254 19$

Chloride (CI)	o oos per cent
Sulphate (SO ₄)	oor percent
Nitrate (NO ₃)	p ooz per cent
Heavy Metals (Pb)	o oo2 per cent
Iron (Fe)	o oor per cent
Calcium (Ca)	o oos per cent

- I Description —Colourless crystals
- 2 Solubility —Dissolve 3 g in 50 ml of hot water A clear colourless solution should be produced

- 3 Chloride —Dissolve r g m 45 ml of warm water and add 5 ml of dilute nutric acid and 0 r ml of silver nutrate solution. No opalescence should be produced
- 4 Sulphate—Ignite 1 g under conditions that will not introduce sulphur Dissolve the residue in 15 ml of hot water add 5 ml of hydrogen persude (20 volumes), boil, cool, add 4 ml of dilute hydrochloric acid and filter. To the filtrate add 30 ml of water and 2 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 5 Nitrate.—Dissolve 1 g in 10 ml of water, add 1 ml of standard indigo solution and 20 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear
- 6 Heavy Metals and Iron.—Dissolve I g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- γ Calcium —Dissolve 1 g in 20 ml of water, add 5 ml of dilute ammonia solution and allow to stand for 4 hours. No turbidity or precipitate should be produced
- 8 Assay—(a) Dissolve 4 g in 50 ml of hot water and titrate with N/1 NaOH using phenolphthalein as indicator

Not less than qq q per cent should be indicated

(b) Dissolve 0.3 g in 50 ml of hot water add 5 ml of sulphuric acid and titrate with N/10 KMnO₄ at a temperature of about 60°

1 ml N/10 KMnO = 0 006355 g KH2(C2O4)2 2H2O

Not less than 99 9 per cent should be indicated

AnalaR POTASSIUM THIOCYANATE

ASSIGN THIOCIANAL

KSCN = 97 18

Maximum Limits of Impurities

Reaction	not over pH 7 o
Chloride (Cl)	0 005 per cent
Sulphate (SO ₄)	oor percent
Heavy Metals (Pb)	o ooi per cent
Iron (Fe)	o ooot per cent
Ammonia	no reaction
Other Sulphur Compounds (S)	cool per cent

(Continued overleaf)

POTASSIUM THIOCYANATE-continued

212

- 1 Description.-Colourless deliquescent crystals,
- 2 Solubility.-Dissolve 5 g in 50 ml of water, a clear colourless solution should be produced I we grame dissolve completely in 50 ml of hot go per cent alcohol
- 3. Reaction.-Dissolve 1 g in 10 ml of carbon dioxide-free water The solution should not be alkaline to bromothymol blue
- 4 Chloride,-Dissolve 1 g with 1 g of ammonium nitrate in 30 ml of hydrogen perovide (20 volumes), add 1 g of sodium hydroxide, warm gently and rotate the flash until a vigorous reaction commences When this has abated, add a further 30 ml of hydrogen perovide and boil for 2 minutes, cool and add to ml of dilute natric acid and 1 ml of silver nitrate solution. Any opalescence produced should not exceed that given by 0 5 ml of standard chloride solution (1 ml = 0 1 mg Cl) in an equal volume of solution containing the quantities of reagents used in the test
- 5 Sulphate Dissolve 5 g in 50 rol of water add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Heavy Metals.-Dissolve 2 g in 45 ml of water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Iron -Dissolve 6 g in 30 ml of water, add 1 ml of dilute hydrochloric acid and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating z g dissolved in 5 ml of water with z ml of dilute hydrochloric acid, 0 5 ml of standard iron solution (1 ml = 0 or mg I'el and so mi of the muxture of amyl alcohol and amyl acetate in the same manner
- 8 Ammonia.-Boil 1 g with 5 ml of sodium hydroxide solution No odour of ammonia should be perceptible
- o Other Sulphur Compounds.-Dissolve 5 g in 25 ml of water, add a mixture of 20 ml of dilute ammonia solution and 4 ml of silver nitrate solution and warm on a water bath for 15 minutes. Any brown colour produced should not be greater than that given by adding a few drops of sodium sulphide solution to a mixture of 30 ml of water, 20 ml of dilute ammonia solution and 3 ml of N/1000 AgNO2, and warming on a water-bath for 15 minutes
- 10 Assay. Dissolve 0 4 g in 50 rol of water, add 5 ml of dilute nitric acid and 50 ml of N/10 AgNO3 and titrate the excess silver with N/10 NH4SCN using ferric ammonium sulphate as indicator

1 ml N/10 AgNO₃ = 0 009718 g KSCN

Not less than 98 per cent should be indicated

250-PROPYL ALCOHOL

 $(CH_1)_2CHOH = 60 09$

Maximum Limits of Impurities

 Water-insoluble Matter
 nl

 Acidity
 o o i ml
 N/1 per cent

 Alkalinity
 o o i ml
 N/2 per cent

 Non-volatile Matter
 o oog per cent

 Aldehydes and Ketones ((CH₂),tCO)
 oog per cent

 Oxygen absorbed (O)
 o oog per cent

 Water
 o oog per cent

- 1 Description -A clear colourless liquid with a characteristic odour
- 2 Solubility.—Miscible in all proportions with water forming clear colourless solutions
- 3 Reaction —Mix 10 ml with 10 ml of carbon dioxide free water The solution should be neutral to bromothymol blue or should not require more than 0 1 ml of N/100 HCl or N/100 NaOH to render it so
 - 4 Specific Gravity (15 5°/15 5°) -0 789 to 0 791
 - 5 Refractive Index -no 1 3750 to 1 3780
- 6 Boiling Range -- Not less than 95 per cent should distil between 81 5° and 82 5°
- 7 Non-volatile Matter.—Evaporate 25 ml to dryness on a waterbath Not more than 1 mg of residue should be left
- 8 Aldehydes and Ketones.—Mix in a stoppered cylinder 25 ml with 25 ml of water and 50 ml of hydroxylamine hydrochloride reagent, allow to stand for 5 minutes and titrate with NIO NaOH to the same green colour as shown by 50 ml of the reagent contained in a similar cylinder, both being viewed down the axes of the cylinders. Not more than 10 ml of NIO NaOH should be required.
- 9 Oxygen Absorbed.—To 10 ml add 0 o5 ml of N/10 KMnO, The pink colour should person for 10 minutes.
- 10 Water.—Thrate 20 ml of methyl alcohol, electrometrically, with Karl Fischer reagent, then add 20 g of the sample and again titrate with Karl Fischer reagent until a small excess is present and a permanent rodine colour has been established. Immediately back titrate this excess, electrometrically, with a standard solution of water in methyl alcohol. The volume of Karl Fischer reagent used after the addition of the sample should be equivalent to not more than 50 mg of vater.

ANALAR PYRIDINE

C.H.N = 70 10

Maximum Limits of Impurities

- Description.—A clear colourless liquid with a characteristic odour
 Solubility.—Miscible in all proportions with water forming clear
- 2 Solubility,—Miscible in all proportions with water forming clear colourless solutions
 - 3 Weight per mi. at 20°.—0 980 to 0 983 g 4 Refractive Index.— n_b^{∞} 1 5070 to 1 5090
- 5 Boiling Range -Not less than 95 per cent should distil between
- 6 Non-volatile Matter.—Evaporate 10 ml to dryness and ignite
- gently Not more than 1 mg of residue should be left
 7 Chloride.—Dissolve 2 ml in 45 ml of water and add 5 ml of dilute
 nutric acid and 1 ml of silver instrate solution. No opalescence should be
 produced.
- 8 Copper.—Dissolve 5 ml in 10 ml of water and 5 ml of dilute acetic acid, add 5 ml of ammonium thiocyanate solution and 5 ml of chloroform, shake vigorously and allow to separate The chloroform layer should not be coloured yellow or green
- 9. Ammonla.—Dissolve a ml in to ml of carbon dioxide free water and add o 1 ml of phenolphthalein solution No pink colour should be produced
- To Oxygen Absorption.—Mix 5 ml with 0 o5 ml of N/to KMnO4 and allow to stand for 1 hour 'The pink colour should not entirely disappear
- 11. Water.—Tittet 40 g slowly with Karl Fischer reagent until a small excess is present and a permanent rodine colour 32 established Back tittate this excess, electrometrically, with a standard solution of water in methyl advisol. The volume of Karl Fischer reagent used about the equivalent to not more than 100 mg of water.
- 12 Assay.—Dissolve 3 g in 20 ml of water and titrate electrometrically with N/t HCl to pH 28

I ml N/r HCl \equiv 0-07910 g C₆H₆N Not less than 99 per cent should be indicated

AnalaR PYROGALLOI.

C,H,(OH), (1 2 3-) = 126 11

Maximum Limit of Impurity

Sulphated Ash

o os per cent

- 1 Description.-Light white crystalline powder or dense white crystals
- 2 Solubility.—Very soluble in water and in alcohol A solution of i g in 20 ml of freshly boiled and cooled water is at first almost colourless but slowly becomes brown on exposure to pir
- 3 Reaction.—The solution obtained in the above test should be neutral to methyl orange
 - 4 Melting Point-132° to 134°
- 5 Sulphated Ash.—Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left

ANALAR QUINHYDRONE

 $C_4H_4O_2C_4H_4(OH)_2 = 218 20$

Maximum Limits of Impurities

Alcohol-insoluble Matter Sulphated Ash nıl o 1 per cent

- 1. Description -A lustrous dark green crystalline powder
- 2 Solubility.—Slightly soluble in water Dissolve t g in 50 ml of 90 per cent ethyl alcohol, a clear orange-brown solution should be produced.
 - 3 Melting Point-170° to 172°
- 4 Sulphated Ash.—Moisten r g with sulphuric acid and ignite gently Not more than r mg of residue should be left
- 5 Assay.—(a) Quinone—Dissolve 0 4 g in 10 ml of warm alcohol, cool, add a cold solution of 2 g of potassium todide in 40 ml of dilute hydrochloric acid and titrate at once with N/10 Na₂S₂O₃, using starch solution as indicator

1 ml N/10 Na.S.O. = 0 005405 g C.H.O.

Not less than 49 2 per cent. and not more than 49.7 per cent, should be indicated

(Continued overleaf)

ANALAR STANDARDS

QUINHYDRONE—continued

(b) Quinol — Dissolve 4 g of sodium bicarbonate in 300 ml of water, and 50 nl of vg of the quinh\u00e4dron and shake until most is dissolved Add 50 ml of N/10 iodine solution shake until the quinh\u00e4drone is completely dissolved and titrate after 5 minutes with N/10 Na₂S₂O₃ using starch solution as indicator.

1 ml N/10 I = 0 005505 g CaHa(OH)2

Not less than 50 2 per cent and not more than 50 7 per cent should be indicated

ANALAR

RESORCINOL

 $C_tH_4(OH)_2 = 110 11$

Maximum Limits of Impurities

Acidity Sulphated Ash Diresprenol and Phenol passes test a or per cent no reaction

r Description —A colourless crystalline powder becoming pink on exposure to air and light

2 Solubility —Very soluble in alcohol Dissolve i g in 50 ml of water a clear colourless solution should be produced

3 Melting Point -110° to 112°

4. Acidity —Dissolve 1 g in 10 ml of carbon dioude free water add 0.05 ml of N/10 NaOH and 0.1 ml of bromocresol green solution. A blue colour should be produced.

5 Sulphated Ash -- Moisten 5 g with sulphuric acid and ignite gently. Not more than 0 5 mg of residue should be left

6 Diresorcinol and Phenol—Dissolve r g in 10 ml of water A clear solution should be produced and on warming no phenolic odour should be perceptible

ANALAR

SALICYLALDOXIME

C.H.(OH) CH NOH = 137 13

Maximum Limit of Impurity

Sulphated Ash 0 05 per cent

Sensitivity to Copper (Cu) 1 2 000 000 minimum

1 Description -White or cream coloured crystals or powder

- 2 Solubility—Soluble in other benzene and dilute hydrochloric and Dissolve i g in 5 ml of alcohol and 45 ml of water A clear colour less solution should be produced
 - 3 Melting Point -- 56° to 58°
- 4 Sulphated Ash—Noisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Sensitivity to Copper—Add 1 ml of a 1 per cent solution in 5 per cent aqueous alcohol to a mixture of 1 ml of standard copper solution (1 ml = 0 ot mg Cu) 19 ml of water and 2 drops of dilute acetic acid A turbulity should be produced within 5 minutes

ANALAR SALICYLIC ACID

 $C_tH_t(OH) COOH = 138 12$

Maximum Limits of Impurities

Sulphated Ash	o oz per cent
Chloride (Cl)	0 001 per cent
Sulphate (SO ₄)	001 per cent
Heavy Metals (Pb)	0 0004 per cent
Iron (Fe)	o oooi per cent
Organic Impurities	passes test

- 1 Description -Small colourless crystals
- 2 Solubility —Readily soluble in alcohol Dissolve 1 g in 50 ml of hot water a clear colourless solution should be produced
- 3 Melting Point-158° to 159°
- 4 Sulphated Ash -- Moisten 5 g with sulphune acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Chloride —Dissolve 3 g in 90 ml of hot water cool and filter, to 30 ml of the filtrate add 20 ml of water 1 ml of dilute nitric acid and 1 ml of silver nitric solution. No opalescence should be produced
- 6 Sulphate—To a further 30 ml of the filtrate from Test No 5 add 20 ml of water 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 7 Heavy Metals—Dissolve 5 g m 40 ml of water and 10 ml of dulute ammonta solution, the solution should not be more than sighther coloured and on passing hydrogen sulphide through the solution for a few seconds any increase in the colour should not be deeper than the standard colours defined in appendix 2

(Cont nued overleaf)

SALICYLIC ACID-continued

- 8 Iron Dissolve 5 g in 50 ml of alcohol and add 1 drop of hydrogen peroxide (20 volumes) and 1 drop of dilute ammonia solution No violet colour should be produced
- o Organic Impuritles Dissolve of g in 10 ml of sulphune acid The colour of the solution should not be deeper than pale yellow 10 Assay,-Dissolve 5 g in 20 ml of alcohol and titrate with N/1 NaOH using phenol red as indicator
 - r ml N/r NaOH ≅ o 1381 g C₄H₄(OH) COOH

Not less than qq q per cent should be indicated

ANALAR SELENIUM

Se = 78 o6

Asn	OI per cen
Sulphur (S)	0 oog per cen
Tellurium (Te)	Or per cen
Nitragen (N)	0 02 per cen
Moisture	Ot per cen

- 1 Description -Very dark red to black powder or solid
- 2 Solubility.- Dissolve 1 g in 5 ml of nutric acid and dilute to 50 ml with water. A clear and almost colourless solution should be obtained
- 3 Melting Point -216° to 222°
- 4 Ash —Ignite 2 g gently Not more than 2 mg of residue should be left
- 5 Sulphur.-Dissolve 1 g in 5 ml of nitric acid and evaporate on a water-bath to dryness, dissolve the residue in 50 ml of hot water, add s ml of so per cent w/w hydrazine bydrate solution and 5 ml of dilute hydrochloric acid, boil to precipitate the selenium, filter, evaporate the filtrate to about 40 ml , cool, make up to 50 ml and add 1 ml of barium chloride solution. No turbidity or precipitate should be produced
- 6 Tellurium -Dissolve o 5 g in 2 5 ml of nitric acid and evaporate to dryness on a water bath, dissolve the residue in 50 ml of bydrochloric seed, pass in sulphus disorde for half in hour and allow to stand for twentyfour hours, filter, evaporate the filtrate to 10 ml on a water-bath, add to ml of saturated sulphur dioxide solution and 5 ml of 50 per cent w/w hydrazine hydrate solution and boil Any tellurium present will precipitate as a black powder Tilter on a weighed sintered glass crucible, wash with hot water, then with alcohol and dry at 100° Not more than or mg of residue should be obtained

- 7 Nitrogen.—Digest r g with 20 ml of sulphure acid, 0 r g of sucrose, and 5 g of potassium sulphate until complete oxidation has taken place Cool, dilute with water, and add 150 ml of a previously boiled solution containing 30 g of sodium hydroxide Distil, and collect the distillate in 10 ml N/100 H₂SO₄ and titrate the excess of acid with N/100 NaOH using methyl red as indicator. Carry out a blank determination in the same manner. The difference between the two titrations should not exceed 14 ml.
- 8 Moisture. Dry 5 g at 110° for 1 hour The loss in weight should not exceed 5 mg
- 9 Assay.—To 03 g add 5 ml of hydrochloric acid and 1 ml of nitric acid and heat under refuto dissolve. Cool, dilute to 100 ml with water, add strong ammonia solution until alkaline, neutralise with dilute hydrochloric acid and add 5 ml in excess. Add zg of hydrarine sulphate and heat gently under refux until the precipitate congulates and becomes entirely black. Filter through a sintered glass crucible No. 4, wash with hot water until free from chloride and finally with a little alcohol. Dry at 105° C and weigh the schenum.

Not less than 99 per cent should be indicated

ANALAR SEMICARBAZIDE HYDROCHLORIDE

NH, NH CO NH, HCl = 111 54

Maximum Limits of Impurities

Sulphated Ash Hydrazine (NH₂,NH₂) o I per cent o 5 per cent

- Description.—A white crystalline powder
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
 - 3 Melting Point,-173° to 178° with decomposition
- 4 Sulphated Ash.—Moisten 5 g with sulphuric acid and ignite gently. Not more than 5 mg of residue should be left
- 5 Hydrazine.—Dissolve o 2 g in 100 ml of water and to 5 ml of this solution add r ml of a solution of 0 g of p-dimethylaminobenzaldehyde in 20 ml of alcohol and 2 ml of hydrochloric acid. Allow to stand for 15 minutes. The solution should show no praige tink when compared with a blank from which the semicarbazide hydrochloride is omitted.
- 6 Assay.—Dissolve 0.2 g in 10 ml of water and 30 ml of hydrochloric acid in a stoppered bottle, add 2 ml of chloroform and titrate with (Continued overleaf)

SEMICARBAZIDE III DROCHLORIDE—cont mied M/20 KIO, with vigorous shaking until the colour is discharged from

the chloroform globule

r ml M/20 KlO₃ = 0 005577 g NH₂ NH CO NH₂ HCl

Not less than 99 per cent should be indicated

ANALAR SILVER NITRATE

 $AgNO_8 = 16989$

Maximum Limits of Impurities

0 05 per eent

1 Description -Colourless crystalline plates

Alkalis and other Metals

2 Solubility.—Dissolve 5 g in 30 ml of water a clear colour less solution should be produced Dissolve 0 5 g in 0 5 ml of water and add a0 ml of ethyl alcohol (99-100 per cent) a clear colourless solution should be produced

3 Chloride—To the aqueous solution from Test No 2 add 1 ml of dilute nitric acid. No opalescence should be produced

4 Sulphate - Dissolve 2 g in 50 ml of water add 1 ml of dilute nitric acid and 1 ml of barrum nitrate solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.

g Copper, Bismuth and Lead—To the solution from Test No 3 add to ml of dilute ammonia solution A clear colouriess solution should be produced

6 Alkalis and other Metals—Dissolve 2 g in 50 ml of water add 3 ml of dilute hydrochloric acid filter evaporate the filtrate to dryness and ignite gently in porcelain or ailica. Not more than 1 mg of residue should be obtained

7 Assay — Deserve r g at 150 ml of states heat to booling add slowly with constant stirring 2 ml of dilute hydrochloric and boil gently for 5 minutes and set aside in the dark to cool. Filter through a Gooch crucible wash dry at 130° and weigh the resulting silver chloride

Weight of AgCl x 1 18, = we ght of AgNO,

Not less than 99-9 per cent should be ind cated

ANALAR SILVER SULPHATE

Ag,SO4 = 311 83

Maximum Limits of Impurities

Chloride (Cl)	o oor per cent
Nitrate (NO ₃)	o oor per cent
Copper .	no reaction
Bismuth .	no reaction
Lead .	no reaction
Iron (Fe)	o oor per cent
Alkalis and other Metals (as suinha	tes) o 2 per cent

- r. Description.—White crystalline powder, darkening on exposure to light
- 2 Chloride -- Dissolve 1 g by boiling with 45 ml of water and 5 ml of dilute mitric acid. No residue or opalescence should remain
- 3 Nitrate.—Suspend 1 g in 5 ml of water, add 0.5 ml of standard indigo solution and 5 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear
- 4 Copper, Bismuth, and Lead.—Shake 2 g with 10 mi of dilute ammonia solution A clear colourless solution should be produced
- 5 Iron.—Dassolve the residue from Test No 6 by heating with 2 ml of hydrochlone seid, dilute with 10 ml of water and add 1 drop of N/10 KMnO₄, mix, add 5 ml of ammonum theoryanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, share vigorously and allow to separate Any colour produced should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 001 mg Fe) in the same manner
- 6 Alkalis and other Metals.—Dissolve 1 g in 50 ml of water and 5 ml of dilute nitric acid, heat to boiling, add slowly with stirring 2 ml of dilute hydrochloric acid, filter, evaporate the filtrate to dryness in porcelain or silica and ignite. Not more than 2 mg should be obtained.
- 7 Assay.—Dissolve 0.5 g in 15 ml of dilute natric acid, dilute to about 50 ml with water, add 0.5 g of ferric ammonium sulphate and tutrate with N/10 NH,8CN

1 ml N/10 NH4SCN = 0 01559 g Ag2SO4

Not less than 99 per cent should be indicated

SODIUM ACETATE (ANHYDROUS)

 $CH_2 COON_2 = 82.04$

Maximum Limits of Impurities

Chloride (CI) Sulphate (SO₄)

0 002 per cent

1 Description .- Pale grey crystalline masses

- 2 Solubility —Dissolve 5 g in 50 ml of water The solution should show not more than a slight brown colour or turbidity
- 3.4 Tests for Chloride and Sulphate are carried out as described for Sodium Acetate (Hydrated) using in each test one half the specified quantity of the sample.
- 5 Assay -- Moisten 1 g with sulphune acid ignite and weigh the resulting Na₂SO₄

Weight of Na₂SO₄ × 1 155 = weight of CH₂ COONa

Not less than 98 per cent should be indicated

ANALAR SODIUM ACETATE (HYDRATED)

CH₁ COONs 3H₂O = 136 09

Maximum Limits of Impurities

 Reaction
 passes test

 Chloride (Cl)
 0 001 per cent

 Sulphate (SO₄)
 0 005 per cent

 Heavy Metals (Pb)
 0 005 per cent

 Iron (Fe)
 0 005 per cent

 Calcium (Ca)
 0 01 per cent

 Oxycen absorbed (O)
 0 004 per cent

1 Description -- Colourless crystals

2 Solubility — Readily soluble in alcohol Dissolve 5 g in 50 ml of water, a clear colourless solution should be produced

3 Reaction — Dissolve 1 g in 10 ml of carbon dioxide free water and add 0 1 ml of thymolphthaten solution. There should be no change in colour and on the further addition of 0 1 ml of phenolphthalein solution a pink colour should be produced.

4 Chloride — Dissolve 1 g in 50 ml of water and add 1 ml of dilute nittic acid and 1 ml of silver mirate solution. No opalescence should be produced.

- 5 Sulphate.—Dissolve 2 g in 50 ml of water, add i ml of dilute hydrochloric acid and i ml of barium chloride solution and allow to stand for i hour. No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours' defined in appendix 2
- 7 Calcium.—Dissolve I g in 20 ml of water and add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution. No turbidity or precipitate should be produced.
- 8 Oxygen Absorption —Dissolve 1 g in 100 ml of boiling water, add 0 05 ml of N/10 kMnO4 and boil for 5 minutes The pink colour should not entirely disappear

ANALAR SODIUM ARSENATE

Na.HAsO. 7H.O = 112 02

Maximum Limits of Impurities

Reaction	рн 8 8-9 о	
Carbonate	passes test	
Chloride (Cl)	o cor per cent	
Sulphate(SO ₄)	ooi per cent	
Nitrate (NO ₂)	0 002 per cent	
Arsenite (As ₂ O ₂)	o oos per cent	
Heavy Metals (Pb)	o oor per cent	
Iron (Fe)	o ocos per cent	
Loss on drying	aS to 41 per cent	

- r Description -White crystals or crystalline powder
- 2 Solubility—Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Reaction—The reaction of a solution of 1 g in 50 ml of carbon dioxide-free water should be between the limits of ρ H 8 8 and 9 0 using thymol blue as indicator.
- 4 Carbonate —Dissolve 5 g in 50 ml of boiling water and to the hot solution add 10 ml of dilute hydrochloric acid. No effervescence should be produced.
- 5 Chloride —Dissolve 1 g in 50 ml of water and add 2 ml of dilute mtric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 6 Sulphate —Dissolve I g in 50 ml of water add I ml of dilute hydrochloric acid and I ml of barum chloride solution and allow to stand for 2 hours. No turbidity or precipitate should be produced

(Cont nued overleaf)

SODIUM ARSENATE-continued

- 7 Nitrate —Dissolve i g in 10 ml of water, aild 1 ml of standard indigo solution and 10 ml of sulphune and and heat to boiling. The blue colour should not entirely dissoner.
- 8 Arsenite.—Dissolve to g in 50 ml of water, add 7 ml of ddute sulphure acid and 5 g of sodium bicarbonate and titrate with N/10 I using starch solution as indicator Not more than 0 i ml of N/10 I should be required
- 9 Heavy Metals and Iron Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 10 Loss on Drying.—Dry 0 5 g at 150° for one hour The loss in weight should not be greater than 0 205 g and should not be less than 0 190 g
- II Assay Dissolve the dried material obtained in Test No 10 in 3 ml of dilute hydrochloric acid and 12 ml of water, warm on a water bath for 5 minutes, add 4 g of portssiam nodide warm on a water bath for a further 10 minutes and cool Remove the 10 dine by litration with N/10 Na₂S₂O₂ using starch as indicator, add 5 g of sodium bicarbonate and tirate with N/10 obtain

1 ml N/10 I = 0.000296 g Na,HAsO,

Not less than 99 per cent and not more than 100 5 per cent. should be indicated

ANALAR

SODIUM BICARBONATE

NaHCO, = 84 02

Maximum Limits	of Impurities
Carbonate (NatCO)	10 per cent
Chloride (Cl)	o oos per cent
Sulphate (SO ₄)	o oog per cent
Nitrate (NOs)	o oo2 per cent
Phosphate (PO4)	o oot per cent
Silicate (SiO2)	o oos per cent
Heavy Metals (Pb)	a cos per cent
Iron (Fe)	o ooos per cent
Calcium, Magnesium and	
Insoluble Matter	oor per cent
Ammonia (NH ₂)	o ooos per cent
Iodine absorbed (I)	o ood per cent
Arsenic (As ₂ O ₂)	o ooot per cent
VISCING (1m203)	(1 part per million)

I Description .- A soft white crystalline powder

- 2 Solubility —Dissolve 5 g m 50 ml of warm water A clear colour less solution should be produced
- 3 Carbonate—The reaction of a solution of 1 g in 100 ml of carbon dioxide free water should not be greater than pH 8 5, using thymol blue as indicator
- 4 Chloride—Dissolve 2 g in 45 ml of water and add 6 ml of didute nature acid and 1 ml of silver naturate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 5 Sulphate.—Dissolve 5 g in 100 ml of water, add 15 ml of dilute hydrochloric acid and 2 ml of barium chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced
- 6 Mitrate—Dissolve i g in to ml of dilute sulphuric acid add i ml of standard andgo solution and io ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 7 Phosphate Dissolve 2 g in 10 ml of water in a platinum dish and neutralise with dilute sulphure acid (about 4 ml) add 2 ml of acid in excess and dilute to 40 ml. To 20 ml (retain the remainder of the solution for Test No. 8) add 2 ml of dilute sulphuric acid 1 ml of phosphate reagent No. 2 and 1 ml of phosphate reagent No. 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour defined in appendix 2.
- 8 Silicate —TO 2 ml of the solution retained from Test No 7 add 20 ml of water, 1 ml of dilute sulphune and 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour defined in appendix 2
- 9 Heavy Metals and Iron—Dissolve 2 g in 5 ml of dilute hydrochloric and add 40 ml of water and 5 ml of dilute ammonia solution and pass hydrogen sulphade through the solution for a few seconds. Any colour produced should not be deeper than the standard colours, defined in appendix 2
- 10 Calcium, Magnesium and Insoluble Matter—Boil 10 g for 5 minutes with 50 ml of water and 25 ml of dilute ammonia solution, filter, wash dry ignite and weigh the residue Not more than 1 mg should be obtained
- 11 Ammonia—Dissolve 2 g in 50 ml of water, add 2 5 ml of hydrochloric acid boil to remove carbon dioxide, cool and add 2 ml of sodium hydroxide solution and 2 ml of Neisler's reagent. Any colour produced should not be greater than that given by the addition of 2 ml of sodium hydroxide solution and 2 ml of Neisler's reagent to 50 ml of water containing 1 ml of standard ammonia solution [1 ml = 0 01 mg MH₂)
- 12 lodine Absorption Dissolve to g in 200 ml of freshly builed and cooled water and add 2 ml of starch solution and 0-05 ml of (Continued overleaf)

SODIUM BICARBONATE-cort much

N/10 I A blue colour, which does not disappear within 1 hour should be produced

- 13 Arsenic.—Dissolve 5 g in 16 ml of brominated hydrochloric acid and 45 ml of water add a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a 0 coop mg standard stain.
- 14 Assay Dissolve 4 g in 50 ml of water, and titrate with $\rm N/r$ HCl using bromophenol blue as indicator

1 ml N/1 HCl = 0084 g NaHCOa

Not less than 99 5 per cent should be indicated

ANALAR

SODIUM BISMUTHATE

NaB O3 = *80 00

Maximum Limits of Impurities

Chloride (Cl)
Manganese (Ma)

0 005 per cent

- r Description —A yellow or brown amorphous powder
- 2 Chloride —Treat 2 g with 15 ml of water 10 ml of dilute nature acid and 5 ml of hydrogen peroude (20 volumes) When the reaction has ceased filter if necessary and to the filtrate add 20 ml of water and 1 ml of aliver nature solution. Any opplescence produced should not be greater than the standard opalescence defined in appendix 2
- 3 Manganese—Boil gently 2 g with 15 ml of nitric acd and 35 ml of water until dissolved. Cool add a further 0.5 g of the sample, shake occasionally during 5 minutes and allow to stand until clear or filter through asbestos or sintered glass. Any pink colour produced should not be greater than that given by 50 ml of water containing 0.1 ml of N/100 KMinO.
- 4 Assay—Treat of g with 10 ml of nater 5g of potassium nodule and 40 ml of dutte hydrochloric acid. Allow to stand for 30 minutes add starch solution (since the solution remains a deep jellow colour throughout the turation it is desirable to add the indicator at this siage) and titrate the liberated colone with N/10 N-82-5Q.

 $_{1}$ ml N/10 Na₂S₂O₃ \equiv 0-014 g, NaBiO₃

Not less than 85 per cent should be indicated

SODIUM BISULPHATE

NaHSO4 = 120 07

Maximum Limits of Impurities

Chloride (Cl)	o ogos per cent
Nitrate (NO ₃)	a oaz per cent
Heavy Metals (Pb)	a oo2 per cent
Iron (Fe)	o oor per cent
Ammonia (NH ₁)	o ooı per cent,
Arsenic (As ₁ O ₂)	o ooor per cent
	(I part per million)

- r Description -Opaque white masses
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Chloride,—Dissolve 2 g in 50 ml of water and add 1 ml of silver nitrate solution. No opalescence should be produced
- 4 Nitrate—Dissolve I g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphiune acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Heavy Metals and Iron.—Dissolve 1 g in 45 ml of water, add 5 ml of dilute ammonta solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 6 Ammonla.—Dissolve 1 g m 50 ml of water and add 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent Any colour produced should not exceed that given by the addition of 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 2 mg NH₂)
- 7. Arsenic.—Dissolve 10 g in 50 ml of water, add 5 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0 or mg standard stain.
- 8 Assay.—Dissolve 5 g in 50 ml of water and titrate with N/1 NaOH using methyl red as indicator
 - 1 ml N/1 NaOH ≡ 0 1201 g NaHSO

Not less than 99 per cent and not more than 102 per cent, should be indicated.

SODIUM BORATE (Borax)

 $Na_2B_4O_7$ to $H_2O = 381$ 43

Maximum Limits of Impurities

 Carbonate
 no r.action

 Chloride (CI)
 0-001 per cent

 Sulphate (SO₄)
 0-005 per cent

 Heavy Metals (Pb)
 0-005 per cent

 Iron (Fe)
 0-005 per cent

 Calcium (Ca)
 0-01 per cent

 Arsenic (As₄O₄)
 0-005 per cent

 (parts per million)
 (parts per million)

- 7 Description Transparent crystals or a white crystalline powder 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless
- 2 Solution should be produced
 3 Carbonate—Dissolve 1 g in 10 ml of warm water and add 2 ml
- 3 Carbonide Dissolve 2g in to mi of warn water and and 2 mi of dilute hydrochlonic and No effervescence should be produced
 4 Chloride Dissolve 2g in 50 ml of warm water and add 3 ml of
- dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.

 5 Sulphate—Dissolve 2 g in 50 ml of warm water, add 3 ml of dilute hydrochloric acid and 1 ml of britum chloride solution and
- allow to stand for 1 hour No turbidity or precipitate should be produced
 6 Heavy Metals and Iron—Dissolve 2 g in 45 ml of water,
 add 5 ml of dilute ammonia solution and pass hydrogen sulphide through
- the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2

 7 Calcium —Dissolve 2 g in 25 ml of hot water, add 3 ml of dilute
- 7 Calcium Dissorte 2 g m 23 m of now ater, and 3 m of actic acd and 5 m of annonum oralate solution and allow to stand for 10 minutes No turbidity or precipitate should be produced
- 8 Arsenic —Dissolve 2 g, with 4 g of citric acid, in 50 ml of hot water, add 12 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than a 0 00 mg s andard stain
- g Assay.—Dissolve 7 g in 100 ml of water and titrate with N/t HCl using bromophenol blue as indicator

1 ml N/1 HCl = 0 1907 g Na2B4O, 10H2O

Not less than 99 per cent and not more than 101 per cent should be indicated

SODIUM CARBONATE (ANHYDROUS)

Na.CO. = 106 co

Maximum Limits of Impurities

Chloride (Cl)	0 001	per cent
Sulphate (SO ₄)	0 005	per cent
Nitrate (NO ₃)	0 002	per cent
Phosphate (PO.)	0 001	per cent
S licate (SiO.)	2005	per cent
Heavy Metals (Pb)	0 002	per cent
Iron (Fe)	0 001	per cent
		per cem
Ammonia (NH ₂)	0 0002	per cent
Iodine absorbed (I)	0012	per cent
Arsenic (As ₁ O ₁)	0 00004	per cent.
	(0 4 part pe	
Moisture	10	per cent

- Description -A white powder
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Chloride—Dissolve 3 g in 40 ml of water and add 12 ml of ddute nitric acid and 1 ml of s her nitrate solution. Any opalescence produced should not be greater than the standard opalescence defined in appendix 2
- 4 Sulphate —Desoive 5 g m too mi of water add 25 ml of dilute hydrochioric acid and 2 ml of barum chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced
- 5 Nitrate—Dissolve 1 g in 10 nl of dibute sulphune acid add 1 ml of standard indigo solution and 10 ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear
- 6 Phosphate Dissolve 2 g m 20 ml of water in a platinum dish and neutralise with didute sulphuric acid (about 6 ml) add 2 ml of acid in excess and dilute to 40 ml. To 20 ml (retain the remainder for Test No 7) add 2 ml of dilute sulphuric acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour defined in appendix 2
- 7 Silicate —To 2 ml of the solution reta ned from Test No 6 add 20 ml of water 1 ml of didute sulphure aced 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the standard colour defined in appendix 2

(Continued overleaf)

- SODIUM CARBON ATE (ANHYDROUS)-continued 8 Heavy Metals and Iron—Dissolve I g in 5 ml of dilute hydrochloric acid add 40 ml of water and 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the "standard colours"
- defined in appendix 2 a Ammonia.-Dissolve 5 g in 40 ml of water, add a ml of hydrochloric acid, boil to remove carbon dioxide cool and add 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent Any colour produced should not be greater than that given by the addition of 2 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 50 ml of water containing I ml of standard ammonia solution (I ml = 0 or mg NHa)
- 10 lodine Absorption -Dissolve 5 g in 100 ml of freshly boiled and cooled water and add 2 ml of starch solution, e or ml of N/10 I and 20 ml of dilute hydrochloric acid A blue colour should be produced
- 11 Arsenic Dissolve 5 g in 50 ml of water, add 18 ml of brominated hydrochloric acid and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a o ooz mg standard stain
- 12 Molsture -Dry 25 g at about 300° for 15 minutes loss in weight should not exceed 25 mg
- 13 Assay -Dissolve the dried material obtained in Test No 12 in so ml of water and titrate with N/t HCl using bromophenol blue as indicator

1 ml N/1 HCl = 0 0530 g Na,CO,

Not less than 99 9 per cent should be indicated

ANALAR

SODIUM CARBONATE (HYDRATED)

Ns.CO. 10H.O = 286 16

Maximum Lamits of Impurities

212000000000000000000000000000000000000		
Chloride (CI)	0 0015	per cent
Sulphate (SO ₄)	0 0025	per cent
Nitrate (NO.)	100 0	per cent
Phosphate (PO ₄)	0 0005	per cent
Silicate (SiQ.)	0 0025	per cent
Heavy Metals (Pb)	0 001	per cent
Iron (Fe)	0 0005	per cent
Ammonia (NH _e)		per cent
Indine absorbed (I)	0 006	per cent
Arsenic (As ₂ O ₂)		per cent
	(o 2 part pe	r million)

I Description -- Colourless crystals free from efforescence

- 2 Solubility —Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3-11 Other Tests —These tests should be carried out as described under Sodium Carbonate (Anhydrous) Tes s Nos 3 to 11 using in each test double the specified amount of the sample
- 12 Assay —Dissolve 5 g in 50 ml of water and titrate with N/1 HCl using bromophenol blue as indicator

Not less than 99 per cent and not more than 102 per cent should be

ANALAR SODIUM CHLORIDE

NaCl = 58 454

Free Acid	o os mi N/1 per cent
Free Albah	oos ml N/1 per cent
Sulphate (SO ₄)	0 003 per cent
Nitrate (NO ₃)	0 002 per cent
Heavy Metals (Pb)	o oot per cent
Iron (Fe)	o ooos per cent
Barium (Ba)	0 003 per cent
Calcium (Ca)	o oos per cent
Magnesium (Mg)	0 005 per cent
Ammonia (NH ₂)	a oot per cent
Arsenic (As ₂ O ₂)	o ooot per cent
	(1 part per mill on)

- 1 Description -Small white crystals or a crystalline powder
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction.—Dissolve to g in too ml of carbon dioxide free water The solution should be neutral to bromothymol blue or should not require more than ong ml of N/30 NaOH or N/10 HCl to render it so
- 4 Sulphate —Dissolve 5 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barnum chloride solution and allow to stand for 24 hours No turbudity or precipitate should be produced
- 5 Nitrate—Dissolve 1 g in 10 ml of water add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling. The blue colour should not entirely disappear.
- 6 Heavy Metals and Iron,—Dissolve 2 g in 45 ml of water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through title (Cont med overlat)

SODIUM CIII.ORIDE-contrared

solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix a

- 7. Barlum -Dissolve 5 g in 50 ml of water, add 1 ml of dilute sulphuric acid and allow to stand for 2 hours. No turbidity or precipitate should be produced
- 8 Calcium .- Dissolve 2 g m 20 ml of water, add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution and allow to stand for 2 hours No turbidity or precipitate should be produced
- o Magnesium.-Dissolve 2 g in 10 ml of water, add 5 ml of dilute ammonia solution and 5 ml of ammonium phosphate solution and allow to stand for a hours. No turbidity or precipitate should be produced
- 10 Ammonia.-Dissolve 1 g in 50 ml of water and add 2 ml of Nessler's reagent Any colour produced should not exceed that given by the addition of 2 ml of Nessler's reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 01 mg NHa)
- 11, Arsenic,-Dissolve 5 g in 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4 Any stain produced should not be greater than a o oo; mg standard stain
- 12 Assay.-Dissolve 05 g of freshly ignited material in 150 ml of water, acidify with 5 ml of dilute nitric acid and add silver nitrate solution slowly with stirring until present in slight excess (about 35 ml is required) Heat to boiling, allow to cool in the dark, filter through asbestos in a Gooch crucible, wash first with water containing a little nitric acid then with water, dry at 140° and weigh

Weight of AgCl × 0 4078 = weight of NaCl

Not less than 99 9 per cent should be indicated

ANALAR

SODIUM CITRATE

 $Na_{\bullet}C_{\bullet}H_{\bullet}O_{\bullet} 2H_{\bullet}O = 294 12$

Maximum Limits of Impurities

roml N/1 per cent Free Acid somi N/s per cent Free Alkalı o oos per cent Chloride (Cl) oor per cent Sulphate (SO₄) Heavy Metals (Pb) o ooz per cent o oos per cent Iron (Fe) passes test Reducing Substances passes test Organic Impurities

- 1 Description.-Small white crystals or a crystalline powder.
- 2 Solubility.-Dissolve 5 g m 50 ml of water A clear colourless solution should be produced.

- 3 Reaction.—Boil 5 g with 50 ml of water and cool. The solution should be neutral to thymol blue or should not require more than 0 5 ml of N/10 NAOH or N/10 HCl to render it 50
- 4 Chloride.—Dissolve 2 g m 45 ml of water and add 5 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence "defined in appendix 2
- 5 Sulphate.—Dissolve I g in 50 ml of water, add 3 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbubty or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 1 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Reducing Substances.—Dissolve to g in 50 ml of hot water, add 4 g of anhydrous sodium carbonate and 10 ml of cupric sulphate solution and boil for 5 minutes. No turbidity or precipitate should be produced.
- 8 Organic impurities.—Heat 2 g with 10 ml of sulphune and in a bouing water-bath for 1 hour Not more than a pale yellow colour should be produced.
- 9 Assay.—Ignite gently 4 g in a plannum dish until decomposition is complete. Buil the residue with 100 ml of water and 50 ml of N/I H₂SO₄, filter and wash with water. Titrate the filtrate and washings with N/I NaOH using methyl red as indicator.

1 ml N/1 H2SO4 = 0 09804 g Na2C2H2O, 2H2O

Not less than 99 per cent should be indicated

AnalaR

SODIUM COBALTINITRITE

 $Na_sCo(NO_s)_s = 403.98$

Maximum Limits of Impurities

 Chloride (CI)
 0 005 per cent

 Sulphate (SO4)
 0 01 per cent

 Iron (Fe)
 0 002 per cent

 Potassium (K)
 0 07 per cent

Sensitivity to Potassium (K) 1 10,000 minimum

- Description.—An orange-yellow powder
- 2 Solubility.—Dissolve 2 g in 50 ml of water. A clear orange-red solution should be produced.

(Continued overleaf)

SODIUM COBALTINITRITE-continued

- 3 Chloride.—Dissolve 4 g in 60 ml of water, add 5 ml of nitric acid and 40 ml of hydrogen personde (20 oslumes) and warm on a waterbath until decomposition is complete. Cool and to 50 ml of the solution add 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in anneadix 2
- 4 Sulphate.—To a further 25 ml of the solution produced in Test No 3 add 25 ml of water and 1 ml of banum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 5 Iron.—To the remaining 25 ml of the solution produced in Test No 3 add it ml of dilute sulphune acid and evaporate to dryness Dissolve the residue in 50 ml of water and 05 ml of dilute hydrochloric acid Add 05 g of zinc ovide and boil for i minute. Filter and wash with water Dissolve the residue in 4 ml of dilute hydrochloric acid and 50 ml of water, add 05 g of zinc ovide and boil for i minute. Filter and wash with water Redissolve the residue in 5 ml of dilute hydrochloric acid and 5 ml of water. Add i drop of N/10 KM nO, and 5 ml of ammonium thiocyanate solution. Any pink colour produced should not be greater than that obtained by treating 1 ml of standard iron solution from 2 mm. Feb in a similar manner.
- 6 Potassium.—Dissolve 3 g in to roll of water and add the solution to a mixture of 5 ml of water and 2 ml of dilute accute acid and allow to stand for 1 hour. No preceptate should be produced.
- 7 Sensitivity.—Repeat Test No 6 with the addition of 0.1 ml of potassium obloride solution (1 per cent) A distinct precipitate should be produced
- 8 Astay.—Dissolve 2 g in 25 ml of didute sulphune and and evaporate almost to dryness on a sand bath. Allow to cool, add 75 ml of water, 5 g of ammonium chloride, 0.5 g of hydraenie sulphate and 75 ml. of strong ammonia solution. Heat to 60° to 70° and electrolyse for hour with a current of 3.5 amperes using a weighted planum cathode as described in appendix 5. Wash the cathode with water, then with acctone, dry and weight.

Weight of Co × 6854 = weight of Na₂Co(NO₂)₈

Not less than 95 per cent should be indicated

ANALAR

SODIUM DIETHYLDITHIOCARBAMATE

(C,H,),N CS SNa 3H,O == 225 32

Meximum Limit of Impurity

Suiphated Ash 3r to 32 per cent

Sensitivity to Copper (Cu) 1 50,000 000 minimum

- 2 Solubility.—Dissolve 1 g in 50 ml of water. The solution should be clear and colourless, and alkaline to thymolphthalein
- 3 Sulphated Ash —Mosten 2 g with sulphune acid and ignite to constant weight. The residue should weigh not less than 31 per cent and not more than 32 per cent of the weight taken.
- 4 Sensitivity to Copper.—Add 10 ml of a 0 1 per cent aqueous solution to a mixture of 0 2 ml of standard copper solution (1 ml = 0 or mg Cu), 50 ml of water and 2 ml of dilute ammonia solution, and dilute to 100 ml A yellow-brown coloration should develop in the test solution, and a blank solution prepared as above, but with the copper omitted, should exhibit no similar colour

SODIUM DIHYDROGEN PHOSPHATE

NaHaPO, 2HaO = 156 03

Disodium phosphate (Na ₂ HPO ₄)	o 3 per cent	
Chloride (Cl)	o cor per cent	
Sulphate (SO ₄)	oor percent	
Lead (Pb)	o coce per cent	
Iron (Fe)	0 002 per cent	
Calcium and Magnesium	no reaction	
Arsenic (As ₂ O ₂)	o oooi per cent	
	(I part per million)	

- 1. Description.-Small colourless crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —Dissolve 5 g in 200 ml of water, the solution should have a pH value of 4.5 or should require not more than 0 r ml N/t HCI to adjust to that value
- 4 Chloride.—Dissolve 1 g m 50 ml of water and add 1 ml of dilute nutric acid and 1 ml of silver nutrate solution No opalescence should be produced
- 5 Sulphate—Dissolve 25 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 2 ml of barium chloride solution and allow to stand for 2 hours. No turbulty or precipitate should be produced
- 6 Lead—Dissolve 7 g in 30 ml of water and 15 ml of diduct ammonta solution, add 1 ml of poississum cyanide solution, diduct with water to 50 ml and add 2 drops of sodium sulphide solution. Any colour produced should not be greater than that produced by adding 2 drops of sodium sulphide solution to 50 ml of an equeous solution containing

SODIUM DITTA DROGEN PHOSPHATE-continued

- 2 g of the sample, 15 ml of dilute ammonia solution, 1 ml of potassium evanide solution and I ml of standard lead solution (I ml = 0 oI mg Pb)
- 7 Iron .- Dissolve 1 g 10 8 ml of water and add 4 ml of dilute hydrochloric acid and i drop of N/10 kMnO4, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 2 ml of standard iron solution (1 ml = 0 or mg Fe) in the same manner
- 8 Calcium and Magnessum -Dissolve 10 g in 200 ml of water, render alkaline with dilute ammonia solution and allow to stand for a hours No precipitate should be produced
- 9 Arsenic -- Dissolve 5 g m 50 ml of water add 15 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0.005 mg standard stain
- 10 Assay Dissolve c g in 100 ml of water and titrate with N/1 NaOH to pH q 2 using thymol blue as indicator

1 ml N/1 NaOH = 0 156 g NaH.PO, 2H.O ANALAR

Not less than 99 per cent should be indicated

SODIUM HYDROGEN TARTRATE

$NaHC_4H_4O_4.H_4O = 190 00$

Maximum Limits of Impurities

Chloride (CI) o oot per cent Sulphate (SO.) oor per cent Heavy Metals (Pb) o ooz per cent Iron (Fe) O oor per cent Loss on drying 8 to 10 per cent

- I Description -- Colourless crystals or white crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Chloride Dissolve 1 g in 50 ml of water and add 2 ml of dilute nitric acid and 1 ml of silver mitrate solution. No opalescence should be produced
- 4 Sulphate Dissolve I g in 50 ml of water add 2 ml of dilute hydrochloric acid and I ml of barrum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 5 Heavy Metals and Iron.-Dissolve I g in 40 ml of water and to ml of dilute ammonia solution and pass hydrogen sulplinde through the solution for a few seconds Any colour produced should not be deeper than the standard colours defined in appendix 2

- 6 Loss on Drying -Dry 7 g at 110° for 1 hour The loss in weight should be not less than a 56 g and not more than a 70 g
- 7 Assay.-Dissolve 5 g of the dued material from Test No 6 in 50 ml of water and titrate with N/r NaOH using phenolphthalein as indicator

1 ml N/1 NaOH = 0.01721 g NaHC4H4O6

Not less than 99 per cent and not more than 100 5 per cent should be indicated

ANALAR SODIUM HYDROXIDE

NaOH = 40 005

Maximum Limits of Impurities

Chloride (Ci)	10.0	ner cent
Sulphate (SO ₄)	0 005	per cent
Nitrate (NO.)	0 002	per cent
Phosphate (PO ₄)	0 001	per cent
Silicate (SiO ₂)	0 01	per cent
Heavy Metals (Pb)	0 002	per cent
Iron (Fe)	0 001	per cent
Aluminium (Al)	0 005	per cent
Zinc (Zn)	0 002	per cent
Ammonia (NH ₂)	0 001	per cent
Arsenic (As ₂ O ₃)	0 0001	per cent
	(r part pe	r million)
Carbonate (Na,CO,)	20	per cent

- 1 Description —White deliquescent sticks or pellets
- 2 Insoluble Matter Dissolve 50 g, accurately weighed in water, cool and dilute to 500 ml using carbon dioxide free water throughout Not more than a very small amount of insoluble matter should be visible

This solution is referred to as the ' sample solution " in the remaining clauses of this specification

- 3 Chloride Drinte 10 ml of the sample solution with 35 ml of water and add 6 ml of dilute nitrie acid and 1 ml of silver nitrate solution Any opalescence produced should not exceed the "standard opalescence" defined in appendix 2
- 4 Sulphate -Dilute 50 ml of the sample solution with 50 ml of water, add 27 ml of ddute hydrochloric acid and 2 ml of barnum chloride solution and allow to stand for a hour. No turbidity or precipitate should be produced
- Nitrate.-To to ml of the sample solution add cautiously 1 ml of sulphuric acid, cool, add 1 ml of standard indigo solution and 10 ml. of (Continued overleaf)

SODIUM HYDROXIDE—continued

sulphuric acid and heat to boiling. The blue colour should not entirely disappear

- 6 Phosphate.—Dissolve 2 g m 20 ml of water in a platinum dish, neutralise with dilute sulphure acid (about 10 ml), add 2 ml of acid in excess and dilute to 40 ml. To 20 ml (retain the remainder for Test No 7) add 2 ml of dilute sulphure acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in appendix 2
- 7 Silicate.—To 1 ml of the solution retained from Test No 6 add 20 ml of uter, 1 ml of dulute sulphurne acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in appendix 2
- 8 Heavy Metals and Iron—To to ml of the sample solution and 5 ml of dilute hydrochloric acid, to ml of dilute ammonia solution and 25 ml of water and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 9 Aluminium.—To no ml of the sample solution add no ml of dilute actic seid and r ml of ao 1 per cent aqueous solution of ammonium aurine-trearboxylare (*aluminon"), allow to stand for 5 maintes and then add 10 ml of ammonium carbonate solution. Any pink colour produced should not be deeper than that of a solution prepared in the following mainter—To 15 ml of vater add o 5 ml of standard aluminum solution (t ml = 01 mg Al) 1 g of ammonium acetate, 5 ml of dilutte acettic acid, 1 ml of "aluminon" solution and, after a lapse of 5 minutes, 10 ml of ammonium carbonate solution
- 10 Zinc.—Neutralise 20 ml of the sample solution with dilute sulphunc ared (about 10 ml) and add 1 drop in excess Add 1 drop of an monum thocyanate solution and 0 z ml of a ocy per cent alcoholic solution of p dimethylaminostyryl p apphthuzode methyl rodude. The colour produced immediately should not be pink when compared with a solution containing 38 ml of water, 1 drop of dilute sulphunc acid, z drop of ammonium thocyanate solution and 0 z ml of the regent solution.

Alternatively the following polarographic procedure may be employed — Dissolve to g in go in of water, de-ox-genate and polarograph over the range — 9.9 volt to -1.4 volt. Return the solution in the polamgraphic cell, together with the mercury to the solution under test, add o 2 in of standard zince solution (i ml = 1 ing Zh), mix well and polarograph as before. The wave height obtained in the first experiment should not be greater than the increase, in height obtained in the scord experiment.

11. Ammonia — Dilute 10 ml of the sample solution with 40 ml of water and add 2 ml of Nessier's reagent Any colour produced should not exceed that given by the addition of 2 ml of Nessier's reagent to

50 ml of water containing 1 ml of standard ammonia solution (1 ml = 0.01 mg $\,\mathrm{NH_3})$

- 12 Arsenic—To 50 ml of the sample solution add 20 ml of brommated hydrochloric acid and a few drops of stannous chloride solution and test as described in appendix 4. Any stam produced should not be greater than a 0 000 mg standard stam.
- 13 Assay and Carbonate —To 20 ml of the sample solution add 2 ml of baruum chloride solution and titrate with N/t HCl using phenol phthalein as indicator

1 ml N/1 HCl ≡ o o4o g NaOH

Then add bromophenol blue and continue the titration with N/1 HCl

1 ml N/1 HCl = 0 053 g Na₂CO₃

Not less than 96 per cent of NaOH, and not more than 2 per cent of $\rm Na_2CO_3$ should be indicated

ANALAR SODIUM NITRATE

NaNO₂ = 85 00

Maximum Limits of Impurities

Free And	o os mi N/s per cen	1\$
Free Alkalı	o os mi N/I per cen	ıt
Chloride (CI)	o coos per cen	it
Sulphate (SO ₄)	o oos per cen	t
Nitrite (NO)	o oooı per cen	ıt
Iodate (IO ₃)	o occos per cen	ıt
Phosphate (PO ₄)	o oor per cen	ıt
Heavy Metals (Pb)	0 002 per cen	đ
Iron (Fe)	g oot per cen	t

- I Description —Colourless deliquescent crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—Dissolve 10 g in 100 ml of carbon dioxide free water The solution should be neutral to bromothymol blue or should not require more than 0.05 ml of N/10 NaOH or N/10 HCl to render it so
- 4 Chloride Dissolve 2 g m 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution No opalescence should be produced
- 5 Sulphate.—Dissolve 2 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of barum chloride solution and allow to stand for 6 hours. No turbusty or precipitate should be produced

(Continued overleaf)

SODIUM NITRATE—continued

- 6 Nitrite and lodate—Dissolve I g in 10 ml of water, add I ml of dilute sulphuric acid, I ml of starch solution and I ml of cadraum include solution and allow to stand for I minute. No blue colour should be produced.
- 7 Phosphate.—Dissolve 1 g in 20 ml of water, add 3 ml of dilute sulphure acut 1 ml of phosphate reagent No 2 and 1 ml of phosphate reagent No 2 and place in a water bath at 60 for 10 minutes. Any blue colour produced should not be deeper than the 'standard colour' defined in appendix 2
- 8 Heavy Metals and Iron—Dissolve 1 g in 45 ml of water, add 5 ml of dilute ammonr solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the 'standard colours' defined in appendix 2

ANALAR SODIUM NITRITE

NaNO. ≈ 60 00

Maximum Limits of Impurities

Chlorde (Cl) cops per cent Sulphate (SO₄) cor per cent Heavy Metals (Pb) cor per cent Iron (Fe) cor per cent Iron (Fe) cor per cent Corassum (h) cor per cent c

- 1 Description -- White or pale yellow hygroscopic crystals
- 2 Solubility—Dissolve 5 g in 50 ml of water A clear solution should be produced
- 3 Chloride Dissolve 2 g in 45 ml of water and add 5 ml of dilute nitric soid and 1 ml of silver nitrate solution. Any opalescence, produced should not be greater than the 'standard opalescence' defined in appendix 2
 - 4 Sulphate —Dissolve 2 g in 45 ml of water add 5 ml of dilute nature acid and 1 ml of barcium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
 - 5 Heavy Metals and Iron—Dissolve I g in 45 ml of water, add 5 ml of dilute ammonta solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced amount not be deeper than the 'standard colours' defined in appendix 2
 - 6 Potassium —Dissolve 25 g in 10 ml of water, add 3 ml of 10 per cent cobalt nitrate solution and 2 ml of dilute acetic acid and allow to stand for 1 hour. No turbidity or precapitate should be produced
 - 7 Assay —Dissolve 1 g in sufficient water to produce 250 ml, add this solution slowly from a burette to 50 ml of N/10 KMnO₄ acidified

with 10 ml of dilute sulphume acid stirring vigorously throughout the titration and warming to 40° when approaching the end point

1 ml N/10 hMnO, = 0 00345 g NaNO2

Not less than 98 per cent should be indicated

ANALAR SODIUM NITROPRUSSIDE

o og per cent

 $Na_{1}Fe(CN)_{1}NO 2H_{1}O \Rightarrow 297 97$

Maximum Limits of Impurities

Sulphate (SO₄) o or per cent

Ferrievanide o or per cent

1 Description.-Ruby red crystals

Ferrocyanide

- 2 Solubility -Dissolve 5 g in 50 ml of water A clear deep red solution should be produced
- 3 Sulphate Dissolve 1 g in 50 ml of water add 1 ml of dilute hydrochloric soid and 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 4 Ferricyanide Dissolve 1 g in 10 ml of water and add 1 ml of a 10 per cent solution of ferrous sulphate. The surbidity produced should be reddish brown and completely free from any grey or greenish tint.
- 5 Ferrocyanide —Dissolve 2 g in 20 ml of water. To 10 ml of this solution add 0.2 ml of ferric chloride solution. No colour change should be apparent when this solution is compared with the remaining 10 ml.

ANALAR SODIUM OXALATE

(COONa)₂ == 134 o1

Maximum Limits of Impurities

	•
Free Acid	o 5 ml N/1 per cent
Free Alkalı	o 5 ml h/r per cent
Chloride (Cl)	o oo1 per cent
Sulphate (SO ₄)	our percent
Heavy Metals (Pb)	o oo2 per cent
Iron (Fe)	o oot per cent
Calcium (Ca)	o oog per cent
Moisture	or per cent

1 Description —A white crystalline powder

SODIUM OXALATE-continued

- 2 Solubility -- Dissolve 1 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction —Dissolve 2 g in 100 ml of water, add 0.2 ml of phenoliphthaleus solution, boil and cool. The solution if colourless, should become pink on the addition of 0.1 ml of N/10 N3OH, or if pink should become colourless on the addition of 0.1 ml of N/10 HCl
- 4 Chloride Dissolve I g in 45 ml of warm water and add 5 ml of dilute nutrie acid and o I ml of silver nitrate solution No opalescence should be produced
- 5 Sulphate—Ignite r g under conditions that will not introduce sulphur Dissolve the residue in 15 ml of hot water, add 5 ml of hydrogen peroxide (20 volumes) boll, cool add 5 ml of dulte hydrochlone acid and filter. To the filtrate add 30 ml of water and 2 ml of banum chlonde solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 6 Heavy Metals and Iron—Dissolve I g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours' defined in appendix 2
- 7 Calcium Dissolve to g in 250 ml of bot water filter, wash dry sny insoluble matter and weigh. Not more than r mg should be obtained.
- 8 Moisture Dry 10 g of the finely powdered material at 130° for one hour The loss in weight should not exceed 10 mg
- 9. Assay —(a) Iguite gently 3 g of the dired material, obtained in Test No 8 in a platinum dish until decomposition is complete. Boil the residue with 100 ml of water and 50 ml of N/1 H₂SO₄ filter and wish with hot water. Titrate the filtrate and washings with N/1 NaOH using methyl red as indicator.

Not less than qq q per cent should be indicated

(b) Dissolve 0.3 g of the dried material obtained in Test No 8 in 50 ml of water add 5 ml of sulphuric acid and utrate at 60° to 80° with N/10 h MnO.

Not less than 99 9 per cent should be indicated

ANALAR SODIUM PEROXIDE

Na₂O₂ = 77 99

Maximum Limits of Impurities

Chloride (Cl)	 0 04 per cent
Sulphate (SO ₄)	0 005 per cent
Phosphate (PO ₄)	o cos per cent
Silicate (SiO ₂)	o or per cent
Heavy Metals (Pb)	oor per cent
Iron (Fe)	o oos per cent

- Description —A slightly yellowish hygroscopic powder.
- 2 Solubility.—Add 2 g in small portions to 50 ml of water A clear solution should be produced
- 3 Chloride.—Dissolve 0.25 g in 45 ml of water, add 5 ml of dilute nutric scid, boil, cool and add 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- 4. Sulphate.—Dissolve 5 g in 70 ml of water, add 30 ml of dilute hydrochloric acid boil, add 2 ml of barium chloride solution and allow to stand for 6 hours No turbidity or precipitate should be produced
- g Phosphate—Dissolve o 5 g in 20 ml of water in a platinum dish, add 3 ml of dilute sulphune acid and evaporate to dryness. Dissolve the residue in 50 ml of water and to 20 ml (retain the remainder for Tests Nos 6 and 7) add 3 ml of dilute sulphune acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in supendix 2
- 6 Suicate—To 5 ml of the solution retained from Test No 5 add 5 ml of water, iml of ddute sulphune acid, 1 ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place in a water-bath at 60° for 10 minutes. Any blue colour produced should not be deeper than the "standard colour" defined in appendix 2
- 7 Heavy Metals and Iron.—To a further 20 ml of the solution produced in Test No 5, add 25 ml of water, 5 ml of dilute ammonia solution and pass hydrogen sulpinde through the solution for a few seconds Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Assay.—To o 2 g add a mixture of 10 ml of potassium iodide solution, 10 ml of dilute hydrochloric acid and 10 ml of water, and titrate the liberated iodine with N/10 ha.S.,03

1 ml N/10 Na2S2O2 = 0.0039 g Na2O2

Not less than 85 per cent should be indicated

SODIUM PHOSPHATE (ANHYDROUS)

Na,HPO, = 141 98

Maximum Limits of Impurities

Reaction	pH g o to g 2
Carbonate	passes test
Chloride (CI)	0 006 per cent
Sulphate (SO ₄)	001 per cent
Heavy Metals (Pb)	0 901 per cent
Iron (Fe)	. 0 oors per cent
Arsenic (As ₂ O ₂)	o coof per cent
	(6 parts per million)
Pyrophosphate (P.O.)	0 2 per cent
Moisture	0 2 per cent

- 1 Description.-A white powder
- 2 Solubility —Dissolve 5 g in 50 ml of warm water. A clear colour-less solution should be produced
- 3-8 Tests for Reaction, Carbonate, Chloride, Sulphate, Heavy Metals and Iron, and Arsenic are carried out as described for Sodium Phosphate (Hydrated) using in each case one third of the specified amount of the sample
- o Pyrophosphate —Dissolve t g in 20 ml of water and to 2 ml of this solution add r ml of a 10 per cent aqueous solution of cadmium sulphate, mix and add to ml of acetic acid slowly with shaking. No opalescence or turbidity should remain.
- 10 Moisture -Dry 5 g at 120° for 1 hour The loss in weight should not exceed 10 mg
- 11 Assay Dissolve the dried material from Test No 10 in 100 ml of water and titrate with N/r HCl to pH 45 using bromocresol green as indicator.

Not less than 99 5 per cent should be indicated

SODIUM PHOSPHATE (HYDRATED)

 $Na_{1}HPO_{4}$ $72H_{2}O = 358$ 17

Maximum Limits of Impurities

Reaction	рн 9 0 to 9 2
Carbonate	passes test
Chloride (CI)	0 002 per cent
Sulphate (SO ₄)	ooi per cent
Heavy Metals (Pb)	o oos per cent
Iron (Fe)	o coos per cent
Arsenic (As ₂ O ₂)	a 0002 per cent
, - +	(2 parts per million)

- 1 Description -Colourless efflorescent crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of warm water A clear colourless solution should be produced.
- 3 Reaction—The reaction of a solution of 2 g in 100 ml of carbon dioxide free water should be between the limits of pH 90 and 92 using thymol blue as indicator
- 4 Carbonate —Dissolve 5 g in 50 ml of boiling water and to the hot solution add 10 ml of dilute hydrochloric acid No effervescence should be produced
- 5 Chloride—Dissolve 5 g in 40 ml of water and add 10 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opalescence? defined in appendix 2
- 6 Sulphate Dissolve 25 g in 50 ml of water, add 25 ml of dilute hydrochloric acid and 2 ml of barunn chloride solution and allow to stand for 2 hours. No turbulty or precipitate should be produced
- 7 Heavy Metals and Iron—Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Arsenic.—Dissolve 5 g in 50 ml of water, add 12 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than 2 0 or mg standard stain
- 9 Assay -Dissolve 6 g in 100 ml of water and titrate with N/1 HCl to pH 4 5 using bromocresol green as indicator

1 ml N/1 HCl = 0 3582 g Na, HPO, 12H2O

Not less than 99 per cent and not more than 102 per cent should be indicated

SODIUM POTASSIUM TARTRATE

NaKC,H,O,4H,O = 282 21

Maximum Limits of Impurities

Free Acid	IOM! N/I per cent
Chloride (CI)	0 cor per cent
Sulphate (SO ₄)	0 or per cent
Heavy Metals (Pb)	0 por per cent
Iron (Fe)	o goos per cent
Reducing Substances .	no reaction

- 1 Description Colourless crystals or a white crystalline powder.
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced.
- 3 Reaction.—Dissolve r g in so ml of carbon dioxide-free water and add o o5 ml of phenolphthalem solution. The solution should be colourless, and should become pink on the addition of o r ml of N/so NaOH.
- 4 Chloride.—Dissolve 1 g in 50 ml of water and add 2 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 5 Sulphate.—Dissolve 1 g in 50 ml of water, add 3 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbulty or precipitate should be produced
- 6 Heavy Metals and Iron.—Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Reducing Substances.—Dissolve 10 g in 250 ml of hot water, add 20 ml of cupric sulphate solution and 15 ml of sodium hydroxide solution and heat in a water-bath at 95° for 30 minutes. No turbidity or precipitate should be produced.
- 8 Assay.—Ignite gently 5 g in a platinum dish until decomposition is complete. But the residue with 100 ml of water and 50 ml of N/1 H₂SO₄, filter and wash with water. Thrate the filtrate and washings with N/1 NaOH using methyl red as indicator.

1 ml N/1 H.SO, = 0 1411 g NakC.H.O. 4H2O

Not less than 99 per cent should be indicated.

ANALAR SODIUM PYROPHOSPHATE

 $Na_4P_2O_7$ 10 $H_2O = 446$ 11

Maximum Limits of Impurities

Reaction	pH 10 2 to 11 2
Chloride (Ci)	0 005 per cent
Sulphate (SO ₄)	o ooi per cent
Heavy Metals (Pb)	0 0005 per cent
Iron (Fe)	0 00025 per cent
Loss on ignition	40 n to 41 o per cent

- 1 Description -Colourless crystals
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction—The reaction of a solution of 1 g in 20 ml of cold carbon dioxide-free water should be between the limits of pH to 2 and 112, determined electrometrically using a glass electrode of the special type for alkaline liquids
- 4 Chloride—Dissolve 2 g in 40 ml of water, add 10 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 5 Sulphate —Dissolve 25 g in 50 ml of water, add 25 ml of dilute hydrochloric acid and 2 ml of barum chloride solution and allow to stand for two hours. No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron —Dissolve 4 g in 45 inl of warm water, cool, add 5 ml of dilute ammonia solution, and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 7 Loss on Ignition Ignite 2 g gently The loss in weight should be not less than 0 80 g and not more than 0 82 g
- 8 Assay.—Dissolve 6 g in 100 ml of water and titrate with N/1 HCl to pH 3 7 using bromophenol blue as indicator

ml of N/1 HCl = 0 2231 g Na,P,O, 10H,O

Not less than 99 per cent and not more than 102 per cent should be indicated

ANALAR SODIUM SELENATE

Na₂SeO₄ 10H₂O = 360 11

Maximum Limits of Impurities

Free Acid 0 25 ml N/1 per cent
Free Alkalı 0 25 ml N/2 per cent
Chloride (Cl) 0 0005 per cent
Sulphate (SO₄) 005 per cent
Nitrate (NO₄) 0004 per cent
Selentie (SO₄) 0 000 per cent
0 0 000 per cent
0 0 000 per cent

- Description —White efflorescent crystals
- 2 Solublity Dissolve 2 g in 50 ml of water A clear colourless solution should be obtained
- 3 Reaction —Dissolve z g in 20 ml of water The solution should be neutral to bromothymol blue or should not require more than 0.05 ml of N/10 H₂SO₄ or N/10 NaOH to render it so
- 4 Chloride—Dissolve 2 g in 20 ml of water and add 30 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced.
- 5 Sulphate Divsolve 1 g in 100 ml of water and 30 ml of hydro chloric acid and 5 g of ammonium acetate heat nearly to boiling and then add 10 ml of 50 per cent w/w hydrazine hydrate solution. Boil until the selentium is precipitated as a black granular powder filter wash and difute to 250 ml with water to 50 ml of this solution add 1 ml of barium chloride solution and allow to stand for 1 hour. Any turbidity produced should not be greater than that obtained by adding 1 ml of barium chloride solution to 50 ml of a blank solution containing 1 ml of standard sulphate solution ($t ml = 0.1 \text{ mg} SO_s$) and equivalent amounts of the reagents used above except selentium
- 6 Nitrate—Dissolve I g in 10 ml of water Warm and add to ml of harum chloride solution. Filter and to 10 ml of the filtrate add 1 ml of standard indigo solution and 10 ml of sulphure acid and heat to boiling. The blue colour should not entirely disappear.
- 7 Selenite.—Dissolve of g in 100 ml of water and 50 ml of dulute sulphure acid add 5 g of anhydrous sodium phosphate followed by 25 ml of N/100 KMnO₄ stand for thirty immutes and then add 25 ml of N/100 FeSO₄(NH₁), SO₄ and beak turate with N/100 KMnO₄. Not more than 2 ml of N/100 kMnO₄ should be required.
- 8 Assay Dissolve 2 g in 60 ml of water add 15 ml of hydrochloric acid and 5 ml of 50 per cent w/w hydrazine hydrate solution boil and allow to stand on the steam bath overnight Filter the precipitated

scienum on a sintered glass crucible or Gooch crucible, wash with hot water until free from chloride, and then with a hitle alcohol Dry at 105° and weigh the scienium

Weight of Se × 4 674 = weight of Na2SeO4 10H2O

Not less than 98 per cent should be indicated

ANALAR

SODIUM SULPHATE (ANHYDROUS)

Na₂SO₄ = 142 06

Maximum Limits of Impurities

Free Acid	o 15 ml N/1 per cent
Free Alkalı G	15 ml N/1 per cent
Chloride (Cl)	o oots per cent
Nitrate (NO _z)	o oog per cent
Nitrite (NO ₂)	o coof per cent
Heavy Metals (Pb)	0 0012 per cent
Iron (Fe)	o ocoó per cent
Zinc (Zn)	o oors per cent
Ammonia (NH ₂)	o cors per cent
Arsenic (As,O ₃)	o oood per cent
,	(6 parts per million)
Onderna and Deducera Substances	no reaction

Oxidising and Reducing Substances no reaction

Moisture 05 per cent

- 1 Description -A hygroscopic white powder or granules
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3-11 Other Tests —These tests should be carried out as described under Sodium Sulphate (Hydrated) Tests Nos 3 to 11 inclusive using one third the quantity of the anhydrous in place of the hydrated salt
- 12 Moisture —Ignite 5 g gently The loss in weight should not exceed 25 mg

ANALAR SODIUM SULPHATE (HYDRATED)

 Na_tSO_t 10 $H_tO = 322.22$

Mexicotron Lamete of Lamete

THE CHARLES DE A	niparines.
Free Acid	o o5 ml N/1 per cent
	o os ml N/1 per cent
Chloride (CI)	o coos per cent
Nitrate (NO ₂)	0 001 per cent
Nitrite (NO _t)	o ooo4 per cent
Heavy Metals (Pb)	o coo4 per cent
Iron (Fe)	0 0002 per cent
Zine (Zn)	0 0005 per cent
Ammonia (NH ₂)	0 0005 per cent
Arsenic (As ₂ O ₂)	0 0002 per cent
	(2 parts per million)
Oxidising and Reducing Substances	no reaction
Loss on Ignition	55 to 56 per cent

- 1 Description -Colourless efflorescent crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water. A clear colouriess solution should be produced.
- 3 Reaction —Dissolve to g m 100 ml of carbon dioxide free water The solution should be neutral to bromothymol blue or should not require more than 0 05 ml of N/10 NaOH or N/10 HCl to render it so
- 4 Chloride Dissolve 2 g in 50 ml of water and add 1 ml of dilute nutric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 5 Mitrate—Dissolve 2 g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphune and and heat to boiling. The blue colour should not entirely disappear
- 6 Mitrite.—Dissolve 5 g in 45 ml of water and add 5 ml of dilute sulphuric acid and 2 ml of m phenylenediamine sulphate solution No yellow or orange colour should be produced.
- 7 Heavy Metals and Iron—Dasolve 5 g in 45 ml of water, add 5 ml of dutte ammona solution and pras hydrogèn sulphide through the solution for a few seconds. The solution should be free from opalescence and ray colour produced should not be deeper than the 'standard colours' defined in appendix 2
- 8 Zinc.—Dissolve 2 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of potassium ferrocyanide solution and allow to stand for 1 hour. No optlescence should be produced

- 9 Ammonia Dissolve 2 g in 50 ml of water and add 2 ml of Nessler 8 reagent. Any colour produced should not exceed that given by the addition of 2 ml of Nesslers reagent to 50 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 or mg NH_2)
- 10 Arsenic —Dissolve 5 g m 50 ml of water add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0 o1 mg standard stain
- 11 Oxidising and Reducing Substances—Dissolve 5 g in 50 ml of water and add a colourless mixture of 1 ml of potassium iodide solution, 1 ml of starch solution and 0 5 ml of dilute hydrochloric acid No blue colour should be produced but on the further addition of 0 05 ml of N/10 1 the solution should become blue
- 12 Loss on Ignition—Dry 2 g accurately weighed at 110° for 1 hour ignite gently and weigh the residue. The loss in weight should not be less than 1 10 g and not more than 1 12 g

ANALAR SODIUM SULPHIDE

 $Na_1S_9H_2O = 240\ 20$

Maximum Limits of Impurities

Polysulphide Sulphite and Thiosulphate (SO₂) passes test o 2 per cent

- 1 Description Moist colourless crystals
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced which does not deposit any sediment on standing
- 3 Polysulphide.—Dissolve I g in 10 ml of water and add 2 ml of dilute hydrochloric acid Not more than a slight turbidity should be produced immediately
- 4 Sulphite and Thiosulphate.—Dissolve t.g. in 100 ml of water and wide 2 g. of time sulphate dissolved in two rid. of water allow to stand for 30 minutes filter and titrate the filtrate with $N/ro\ I$. Not more than 0.6 ml of $N/ro\ I$ should be required
- 5 Assay —Dissolve 2.5 g in water and adjust the volume to 250 ml pipette 50 ml into a mixture of 50 ml of N/10 I 400 ml of water and 25 ml of N/10 II Cl and turnie the excess of 10d ne with N/10 Na₂S₂O₃ using starch as indicator. Correct for sulphite and thiosulphate found in 1est No. 4

1 ml N/10 I - 0 01201 g Na2S 9H2O

Not less than 95 per cent should be indicated

SODIUM SULPHITE

Na₂SO₂ 7H O = 252 18

Maximum Limits of Impurities

- Description —Colourless efflorescent crystals
- 2 Solubility —Dissolve 5 g in 50 ml of water $\,$ A clear colourless solution should be produced
- 3 Chloride.—Dissolve 2 g m 10 ml of dilute nitric and and warm to remove most of the sulphur double. Cool and add 40 ml of water and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2.
- 4 Heavy Metals and Iron—Dissoive 2 g in 45 ml of water, add 5 ml of dilute ammons solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the 'standard colours' defined in appendix 2
- 5 Arsenic—To 5 g add to ml of water 2 g of potassium chlorate and 20 ml of hydrochloric acid, when the reaction has ceased, boil gently to remove chlorine, add 40 ml of water and a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than 2 oor mg standard stain.
- 6 Assay —Dissoive 0.3 g in 50 ml of N/10 I, add 2 ml of dilute

ı ml N/10 I ≡ 0-0126 g Na,SO, 7H,O

Not less than 96 per cent should he indicated

ANALAR SODIUM THIOSULPHATE

 $Na_2S_2O_3SH_2O = 24821$

Maximum Limits of Impurities

Reaction	pH 6 5 to 7 5
Sulphate and Sulphite (SO ₄)	oor per cent
Sulphide (S)	o ocos per cent
Heavy Metals (Pb)	o oor per cent
Iron (Fe)	a coos per cent
Calcium (Ca)	o oos per cent

1 Description — Colourless crystals free from white powder 2 Salubility — Dissolve § n 50 ml of freshly boiled and cooled water A clear colourless solution should be produced

ater A clear colourless solution should be produced
3 Reaction - Dissolve 2 g in 20 ml of carbon dioxide free

3 Reaction — Dissolve 2 g in 20 ml of carbon dioxide free water The reaction of the solution should be between pH 6 5 and pH 75

4 Sulphate and Sulphite—Dissolve 1 g in 10 ml of water add N/10 I in slight excess (about 40 ml) and 1 ml of barium chloride solution. No turbidity or precipitate should be produced

5 Sulphide —Dissolve r g in 20 ml of water and add 0.05 ml of cupric sulphate solution. The solution should not darken in colour

6 Heavy Metals and Iron -- Dissolve 2 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds Any colour produced should not be deeper than the 'standard colours' defined in appendix 2

7 Calcium.—Dissolve z g in 20 ml of water, add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalite solution and allow to stand for 2 hours. No turbidity or precipitate should be produced.

8 Assay,-Dissolve 1 g in 30 ml of water and titrate with N/10 I

1 ml N/10 I = 0 0248z g Na2S2O2 5H2O

Not less than 99 per cent and not more than 101 per cent should be indicated

ANALAR

SODIUM TUNGSTATE

Na,WO, 2H,O = 329 95

Maximum Limits of Impurities

 Reaction
 ph 8 0 to 9 5

 Chloride (Cl)
 0 005 per cent

 Sulphate (SO₄)
 0 01 per cent

 Nitrate (NO₄)
 0 002 per cent

Loss on Ignit on 10 5 to 11 5 per cent

SODIUM TUNGSTATE continued

ODIUM TUNGSTATE—continued

Description.—Colourless crystals or a white crystalline powder
 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced

3 Reaction.—The reaction of a solution of 1 g in 50 ml of carbon dioxide-free water should not be less than pH 8 o and not more than

pH q 5, using thymol blue 23 indicator

- 4 Chloride—Dissolve 2 g m to ml of hot water, add 5 ml of dlute nitric acid and heat on a water-bath for 5 minutes with frequent shaking, dlute with 3 g ml of water, filter and to the filtrate add 1 ml of silver nitrate solution. Any opakesence produced should not be greater than the "standard opakesence" defined in appendix.
- 5 Sulphate.—Dissolve I g m 5 ml of hot water, add 3 ml of dilute hydrochloric acid and heat on a water-hath for 5 minutes with frequent shaking, dilute with 45 ml of water, filter and to the filtrate add 1 ml of barium chloride solution and allow to stand for 1 hour No turbidity or precipitate abould be produced
- 6 Nitrate.—Dissolve I g in 10 ml of water, add I ml of standard indigo solution and 10 ml of sulphune and, heat to boiling and allow to stand for 5 minutes The blue colour should not entirely disappear

7 Loss on Ignition .- Ignite I g gently The loss in weight should

be not less than 105 mg and not more than 115 mg

8 Assay.—Dissolve 0 5 g in 100 ml of water, add 3 ml of N/1 HCl and 10 ml of N/10 H,SO g mix and add 23 ml of benzidine reagent, allow to stand for 5 minutes, filter, wash with the benzidine reagent diluted with 15 parts of water, dry, ignate and weigh the resulting WO₂

Weight of WO, X 1 422 = weight of Na, WO, 2H,O

Not less than 99 3 and not more than 100 5 per cent should be indicated,

ANALAR

STANNOUS CHLORIDE

SnCl, 2H,0 = 225 65

Maximum Limits of Impurities

Sulphate (SO₄) 0005 per cent Alkalis and other Metals (as sulphates) 01 per cent Arsenic (As₁O₄) 00001 per cent

(t part per million)
t, Description.—Colourless crystals

2 Solubility.—Dissolve 2 g in 40 ml of water and 5 ml of dilute hydrochlone and A clear colourless solution should be produced

*Benzidine Reagent -- Dissolve 25 g of benzidine in 6 ml of dilute hydrochloric acid and 94 ml of water

- 3 Sulphate—Dissolve 2 g in 50 ml of water and 1 ml of dilute hydrochloric acid, add 1 ml of batum chloride solution and allow to stand for 1 hour. No turbulaty or precipitate should be produced
- 4 Alkalis and other Metals—Dissolve 2 g in 100 ml of water and 1 ml of dilute hydrochlome and and remove the tin by means of hydrogen sulphide, filter evaporate the filtrate to dryness add 1 drop of sulphiume acid and ignite gently

 Not more than 2 mg of residue should be obtained
- 5 Arsenic.—Dissolve 5 g in 20 ml of 20 per cent hydrochloric acid and distil 15 ml. To the distillate add 45 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0.005 mg standard stain
- 6 Assay —Dissolve 0.5 g in 50 ml of water and 1 ml of dilute hydrochloric acid, add 5 g of sodium potassium tartrate and 3 g of sodium bicarbonate and titrate with N/10 I

I ml N/10 I = 0 01128 g SnCl, 2H2O

Not less than 97 per cent should be indicated

ANALAR STARCH (SOLUBLE)

Maximum Limits of Impurities

Acidity o 8 ml N/1 per cent Sulphated Ash 0 3 per cent Chloride (Cl) o oos per cens Heavy Metals (Pb) o or per cent Iron (Fe) o cos per cent Dextrin passes test Reducing Substances passes test Moisture 150 per cent

- I Description -A white powder
- 2 Solubility —Shake r g with 5 ml of water and pour the suspension into 45 ml of boiling water boil for 2 minutes and cool The solution should be mobile and not more than slightly opalescent
- 3 Acidity —A suspension of 5 g in 50 ml of carbon dioxide free water should be neutral to biomothymol blue, or should not require more than 0 + ml of N/ro NoOH to render it so
- 4 Sulphated Ash —Moisten 2 g with sulphune acid and ignite gently. Not more than 6 mg of residue should be left
- 5 Chloride—Shake 2 g with 20 ml of water for 5 minutes and filter. To the filtrate add 30 ml of water 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opalescence defined in appendix 2

STARCH (SOLUBLE)-continued

- 6 Heavy Metals and Iron —To to ml of the solution produced in Test No 2, add 35 ml of water and 5 ml of olditte ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours' defined mi spenday 2
- 7 Dextrin -To 20 ml of the solution produced in Test No 2, add 0.05 ml of N/10 I A deep blue colour should be produced
- 8 Reducing Substances.—To no ml of the solution produced in Test No 2 add on ml of mixed Fehlings solution and 0 og ml of a or per cent solution of methylene blue and heat in a boiling water-bath for 10 minutes. The blue colour should not entirely disappear.
- 9 Moisture.—Dry 1 g at 100° for 1 hour The loss in weight should not exceed 150 mg

ANALAR

STRONTIUM CHLORIDE

 $SrCl_2 6H_2O = 26664$

Maximum Limits of Impurities

our nor less than 6 a

O D3 Der cent

Sulphate (SO ₄)	0 003 per cent
Nitrate (NO ₁)	0 co2 per cent
Heavy Metals (Pb)	o cor per cent
Iron (Fe)	o coos per cent
Baritim (Ba)	0 2 per cent
Calcium (Ca)	0; per cent

1 Description —Colourless crystals

Deservon

Alkalıs (Na)

- 2 Solubility—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced.
- 3 Reaction —The reaction of a solution of 1 g in 50 ml of carbon dioxide free water should not be less than pH 64 using bromothymol blue as indicator
- 4 Sulphate Dissolve 2 g in 50 ml of water add t ml of dilute hydrochloric acid and r ml of barum chloride solution and allow to stand for 6 hours. No turbidity or precipitate should be produced
- s Nitrate —Dissolve r g in so ml of water add r ml of standard indigo solution and 10 ml of sulphume and and heat to boiling. The blue colour should not entirely disappear
- 6 Heavy Metals and Iron —Dissolve 2 g in 45 ml of carbon diovidefree water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2

- 7 Barium Dissolve 05 g in 25 ml of water, add 1 drop of acetic acid and 05 ml of potassium chromate solution. No turbidity or precipitate should be produced.
- 8 Calcium.—Treat 2 5 g, accurately weighed, with 5 ml of sulphune acid and take to dryness on a sand bath. Cool, and to the residue add 25 ml of perchloric acid (60 per cent) and heat again on the sand bath for 10 minutes. Cool and add 100 ml of boiling water and 5 ml of a mixture of equal volumes of sulphune acid and water. Boil for a few minutes with stirring, allow to stand overnight, filter on a No 42 Whatman paper on a smixtered alundum crucible and wash the solid free from acid Retain the solid for the Assay. To the filtrate add ammonia in slight excess, boil add 1 g of ammonium oxalate and allow to stand for 30 minutes. Filter, wash with water, burn the filter, moisten the residue with sulphune acid, ignite gently and weigh. Not more than 8 mg should be obtained.
- 9 Alkalis.—Dissolve 5 g un 100 ml of water and add 10 ml of dulute armnonia solution and ao nul of ammonium carbonate solution. Warm for a few minutes, filter and wash the precipitate with water. Evaporate the filtrate and washings to dryness and ignite the residue gently to remove ammonium salts. Dissolve the residue in 10 ml of water and 1 ml of dilute nitric acid add 2 ml of dilute ammonia solution and 2 ml of ammonium oxalate solution allow to stand for 1 hour and filter. Evaporate the filtrate to dryness, to the residue add 2 drops of sulphune acid and ignite. Not more than 5 mg of residue should be obtained.
- 10 Assay.—Ignite the washed strontium sulphate obtained in Test No 8 and weigh

Weight of SrSO₄ × 1 452 = weight of SrCl₂ 6H₂O Not less than oS per cent should be indicated

ANALAR SUCCINIC ACID

(CH2 COOH)2 = 118 09

Maximum Limits of Impurities

Sulphated Ash	0 05 per cent
Chloride (Cl)	o oog per cent
Sulphate (SO ₄)	o oos per cent
Heavy Metals (Pb)	0 002 per cent
Iron (Fe)	o oor per cent
Reducing Substances (O)	o oo8 per cent

1 Description.—Colourless crystals

2 Solubllity —Dissolve 5 g in 50 ml of warm water A clear colour less solution should be produced

SUCCINIC ACID-continued

- 1 Melting Point,-186° to 188°
- 4 Sulphated Ash Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 5 Chloride.—Dissolve 3 g m 50 ml of water and add 1 ml of dilute nature acid and 1 ml of aliver natrate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 6 Sulphate.—Dissolve 2 g in 50 ml of water add 1 ml of dilute bydrochloric acid and 1 ml of bartum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced.
- 7 Heavy Metals and Iron.—Dissolve I g in 40 ml of water, add to ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours? defined in appendix 2
- 8 Reducing Substances —Dissolve i g in 20 ml of hot water, cool to about 60° add 0 i ml of N/ro RhinO, and allow to stand for 5 mnutes. The pink colour should not entirely disappear
- 9 Assay -Dissolve 2 g in 50 ml of water and titrate with N/1 NaOH using phenolphthalein as indicator

1 ml N/1 NaOH = 0-05904 g (CH2 COOH)2

Not less than 99 per cent should be indicated

Sulphated Ash

ANALAR

SUCROSE

C11H11O11 = 342 30

Maximum Limits of Impurities

o oz per cent

Chloride (CI)	e coos per cent
Sulphate (SO ₄)	o cos per cent
Heavy Metals (Ph)	o coo4 per cent
Iron (Fe)	o oooz per cent
Reducing Sugars (CaHarOa)	oo; per cent
Nitrogen (N)	o cos per cent
Moisture	0 1 per cent

- I Description.—Colourless crystals or a crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced.
- 3 Sulphated Ash Moisten 10 g with sulphune acid and ignite again moisten with sulphune acid and reignite. Not more than 2 mg of residue should be left.

- 4 Chloride Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution No opalescence should be produced
- 5 Sulphate —Dissolve 2 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barmum chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 5 g in 45 ml of water, add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds

 Any colour produced should not be deeper than the standard colours defined in appendix 2
- 7 Reducing Sugars—Dissolve 1 g in 10 ml of hot water add 0.2 g of potassium entrate 1 ml of cupric sulphate solution and 1 ml of N/1 Na₂CO₃ and place in a bioling water bath for 5 minutes No turbidity or precipitate should be produced
- 8 Nttrogen Digest 1 g with 20 ml of sulphure acid and og g of cupre sulphate until completely ordised Cool dilute with water render alkaline with sodium hydroxide distil and collect the distillate in 10 ml of \(^{1}\)front \(^{1}\)fron
- 9 Moisture Dry 5 g of the finely powdered material at 100° for 1 hour. The loss in weight should not exceed 5 mg

ANALAR SULPHANILIC ACID

C.H. NH, SO.H = 173 18

Maximum Limits of Impurities

Sulphated Ash 0 05 per cent
Chloride (Cl) 0 005 per cent
Sulphate (SO4) 0 005 per cent

- Description —White crystals or a crystalline powder
- 2 Solubility—Dissolve 3 g in 100 ml of hot water. A clear colourless solution should be produced.
- 3 Sulphated Ash -- Moisten 2 g with sulphuric acid and ignite gently. Not more than 1 mg of residue should be left
- 4 Chloride—Dissolve 5 g m 100 ml of hot water add 2 ml of ditute nutric acid cool and filter To 40 ml of the filtrate add 10 ml of water and 1 ml of silver nutrate solution Any opalescence produced should not be greater than the standard opalescence defined in appendix 2

SULPH INILIC ACID—continued

- 5 Sulphate.—To a further 40 ml of the filtrate produced in Test No 4 add to ml of water and 1 ml of banum chloride solution and allow to stand for 1 hour. No turbulity or prepriate should be produced
- 6 Assay —Suspend 5 g in 100 ml of water and titrate with N/1 NaOH using phenolphthalein as indicator

1 ml N/1 NaOH = 0 1732 g C.H. NH. SO.H

Not less than 90 per cent should be indicated

ANALAR

SULPHOSALICYLIC ACID

(Salicylsulphonic Acid)
C.H. OH COOH SO.H.2H.O = 254 22

Maximum Limits of Impurities

Sulphated Ash 0 025 per cent

Chloride (Cl) 0 005 per cent
Sulphate (SO₄) 0 005 per cent
Sulphate (SO₄) 0 005 per cent
Salicylate (C₄H₄O₇) 0 001 per cent
Heavy Metals (Pb) 0 002 per cent
Long (Fe) 0 001 per cent

r Description -- White or cream coloured crystals or crystaline powder

- 2 Solubility —Dissolve 5 g in 20 ml of water. An almost clear solution should be produced
- 3 Sulphated Ash Morsten 2 g with sulphuric acid and ignite gently Not more than 0 5 mg of residue should be left
- 4 Chloride Dissolve 1 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the 'standard opalescence' defined in appendix 2
- 5 Sulphate —Dissolve 2 g in 50 ml of water and add 1 ml of barrum chloride solution. No turbidity or precipitate should be produced
- 6 Sallcylate —Shake o 5 g of the powdered material with 5 ml of benzene and filter through a dry paper Shake the filtrate with 5 ml of water and 1 drop of ferrie ehloride solution. No violet colour should be produced.
- 7 Heavy Metafs Dissofte I g in 45 ml of water add 5 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 8 Iron —Dissolve I g in 50 ml of water and add I drop of hydrogen perovide (20 volumes) Any pink colour produced should not be greater

than that given by 50 ml of water containing o or g of sulphosalicylic acid, 1 ml of standard iron solution (1 ml = 0 or mg I'e) and 1 drop of hydrogen peroxide

9 Assay -- Dissolve 5 g in 100 ml of water and titrate with N/1 NaOH using phenol red as indicator

r ml N/r NaOH ≅ o 1271 g C₀H₃ OH COOH SO₃H 2H₂O Not less than 99 per cent should be indicated

ANALAR

SULPHURIC ACID

(sp. gr. 184)

H₄SO₄ = 98 976

Maximum Limits of Impurities

Non-volatile Matter	o co25 per cent
Chloride (Cl)	0 0003 per cent
Nitrate (NO ₄)	o ooooz per cent
Selenium (Se)	o oor per cent
Heavy Metals (Pb)	o oooz per cent
Iron (Fe)	o ocor per cent
Ammonia (NH ₂)	o ooos per cent
Oxygen absorbed (O)	o oooı per cent
Arsenic (As ₂ O ₃)	o occor per cent
	(o I part per million)

- 1 Description -A clear colourless only liquid
- 2 Non-volatile Matter -- Evaporate 20 g to dryness and ignite gently Not more than 0.5 mg of residue should be left
- 3 Chloride Dilute 2 ml with 50 ml of water and add 1 ml of silver nitrate solution. No opalescence should be produced
- 4 Nitrate —Dilute 6 ml with 2 ml of water cool to about 60° and add 1 drop of hydrochloric acid and 1 ml of diphenylamine reagent No blue colour should be produced
- 5 Selenum —Dilute 1 ml with 10 ml of water and add 1 ml of hydrochlone acid and 5 ml of a 2 per cent aqueous solution of hydrazine sulphate, heat the solution to boiling and allow to stand for 10 minutes No red colour or turbulity should be produced
- 6 Heavy Metals and Iron.—Dilute 5 ml with 30 ml of water, cool add 15 ml of strong ammona solution and pass hydrogen sulphide through the solution for a few seconds be deeper than the standard colours defined in appendix 2
- 7 Ammonia Dilute 1 ml with 40 ml of water, add 10 ml of sodium hydroxide solution and 2 ml of Nessler 8 reagent Any colour (Continued octated)

SULPHURIC ACID-continued

produced should not exceed that given by the addition of 10 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 40 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 or mg NH₂)

- 8 Oxygen Absorption—To 60 ml of water containing 0.05 ml of N/to M/nO₄ add 15 ml of the acid. The pink colour should persist for at least 5 minutes
- 9 Arsenic.—Dilute 11 ml with 50 ml of water, add 0.2 ml of stannous chloride solution and test as described in appendix 4 Any stain produced should not be greater than a 0.002 me standard stain
- 10 Assay —Dilute 2 g with 40 ml of water and titrate with N/1 NaOH using methyl red as indicator

1 ml N/1 NaOH = 0 04904 g H,SO4

Not less than 98 per cent should be indicated

ANALAR

TARTARIC ACID

(CHOH COOH)₂ = 150 09

Maximum Limits of Impurities

Ash	0 02 per cent
Chloride (Cl)	0 0005 per eent
Sulphate (SO ₄)	g co2 per cent
Heavy Metals (Pb)	o ooo8 per cent
Iron (Fe)	o coop per cent
Arsenic (As ₄ O ₄)	o occi per cent
	(1 part per million)

I Description -Colourless crystals

should be produced

- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Ash Ignute 10 g gently, not more than 2 mg of residue should be left
- 4 Chloride.—Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence
- 5 Sulphate —Dissolve 5 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- 6 Heavy Metals and Iron—Dissolve 25 g in 40 ml of water, add to ml of didute ammonts solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the 'standard colours' defined in appendix 2

- 7 Arsenic.—Dissolve 10 g in 50 ml of water, add 10 ml of stannated hydrochloric acid and test as described in appendix 4. Any stain produced should not be greater than a 0 or mg standard stain
- 8 Assay.—Dissolve 3 g in 50 ml of water and titrate with N/I NaOH using phenolphthalein as indicator

1 ml N/1 NaOH = 0 07504 g C4H4O4

Not less than 99 5 per cent should be indicated.

ANALAR TELLURIC ACID

H₄TeO₄ 2H₄O = 229 66

Maximum Limits of Impurities

Chlorde (Cl) cool per cent
Sulphate (SO₄) col per cent
Nitrate (NO₄) col per cent
Selenium (So) passes test
Iron (Fe) col per cent

z Description.-White crystals or crystalline powder

duced

- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Chloride Dissolve 1 g in 50 ml of water and add z ml of natric acid and 1 ml of silver natrate solution. No opalescence should be pro-
- 4 Sulphate Dissolve 1 g in 50 ml water, add 1 ml of dilute hydrochloric acid and 1 ml barium chloride solution, and allow to stand for one hour No turbidity or precipitate should be produced
- 5 Nitrate.—Dissolve 1 g in 10 ml of water, add 1 drop of dilute sulphure acid and 1 ml of a 10 per cent solution of nitros in 10 per cent acetic acid and allow to stand for 30 minutes. No crystalline precipitate should be produced.
- 6 Selenium.—Dissolve 1 g in 10 ml of hydrochloric acid, boil down to about 5 ml and make up to 20 ml with hydrochloric acid Saturate the acid solution with sulphur dioxide No red precipitate should be produced
- 7 Iron—Dissolve 1 g m 10 ml of water and 1 ml of dilute hydro chloric acid and add 1 drop of N/10 KMnO₁, mix, add 5 ml of ammonium thocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that (Continued overtical)

TELLURIC ACID—continued produced by treating r ml of standard iron solution (r ml = 0 or mg fe\) in the same manner

8 Assay — Dissolve o 5 g in 20 inl of hydrochloric acid and boil gently under reflux for 4 hours Cool, wash down the condenser with 20 ml of water and transfer to a beaker, washing out the flask with dilute hydrochloric acid heat to boiling and precipitate the tellurum with sulphur dioxide Filter through a sintered glass crucible wash with water and alcohol and dry at 100°

Weight of Te > 1 799 = weight of H2TeO4 2H2O

Not less than 99 5 per cent should be indicated

ANALAR THALLIUM SULPHATE

T1,504 = 504 85

Maximum Limits of Impurities

Chloride (Ci)
Nitrate (NO₂)
Copper (Cu)

o or per cent o oos per cent no resetton

Description -Colourless cristals or white crystalline powder

- 2 Solubility —Dissolve I g in 50 ml of water $\,$ A clear colourless solution should be produced
- 3 Chloride—Dissolve t g in 50 ml of writer add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opalescence? defined in appendix 2
- 4 Nitrate—Dissolve o 5 g in 10 ml of water, add o 5 ml of standard indigo solution and no ml of sulphune acid and heat to boiling. The blue colour should not entirely disappear.
- 5 Copper —Dissolve 2 g in 40 ml of water and add 10 ml of dilute ammonia solution No blue colour should be produced
- 6 Assay—Dassolve 1 g in 20 ml of water and add 60 ml of lydro chloric acid Tirrate with M₂₀ KiO₃ with vigorous shaking adding 0 5 ml of chloroform towards the completion of the reaction, and con tinuing the tirration until the globule of chloroform becomes colourless 1 ml of M₂₀ KiO₃ ≈ 00.224 g TiSO₃

Not less than 99 per cent should be indicated

ANALAR THORIUM NITRATE

 $Th(NO_3)_4.4H_4O = 552.22$

Maximum Limits of Impurities

o ooz per cent

Chloride (CI) Sulphate (SO₄)

- o oob per cent 1 Description -White deliquescent crystals or crystalline powder
- 2 Solubility Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Chloride Dissolve 5 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the standard opalescence defined in appen dix 2
- 4 Sulphate Dissolve 2 g in 50 ml of water add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 5 Assay -Dissolve o 3 g in 25 ml of water Add 150 ml of a 04 per cent aqueous solution of m nitrobenzoic acid and 2 drops of hydrazine hydrate solution Heat to 80° and keep at this temperature for 10 minutes Allow to stand for 1 hour filter on a Whatman No 41 paper and wash with water containing 5 per cent of the reagent solution. Place in a platinum crucible whilst still wet and burn off carefully to ThO,

Weight of ThO2 × 2 og1 - weight of Th(NO3); 4H2O Not less than 98 per cent should be indicated

ANALAR TIN

Sn = 11870

Maximum Limits of Impurities

Lead (Pb) per cent Copper (Cu) o ocas per cent Bismuth (Bi) 0 002 per cent Iron (Fe) o co2 per cent Total Foreign Metals 0 04 per cent o coor per cent Arsenic (As.O.) (1 part per million) o o25 per cent Anternony (Sb)

1 Description -A silver white metal

TIN-continued

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2 Preparation of Solutions for Lead, Copper, Bismuth, Iron and Arsenic Tests—(a) Mix 10 g with 25 ml of water and 5 ml of hydrochloric acid and add to g of potassium chlorate in small portions at a time, at such a rate that a slight excess of chlorine is maintained throughout, until all the metal is dissolved, cooling if necessary Boil off the excess of chlorine, cool and chitte with water to produce 100 ml.

(b) To 50 ml of the above solution add 25 g of tartanc acid, and sufficient dilute aimpoins solution (about 100 ml) to produce a clear alkaline solution, transfer to a separator and shake with three separate to ml portions of a 0 I per cent solution of diphenylthiocarbazone in chloroform Draw off each portion of the chloroform extract and wash in turn with 10 ml of 2 5 per cent solution of tartanc acid rendered alkaline with aimmonia Evaporate the chloroform from the combined extracts, add x ml of sulphuric acid, heat to furning, cool, add o 3 ml of water and heat to furning a threat time. To the cooled residue add 10 ml of water, 10 g of aimmonium accitate, 5 ml of dilute aimmonia solution and sufficient water to produce 50 ml.

3 Lead.—To 10 ml of solution 2b add 5 ml of dilute ammonia solution, 1 ml of potassium cyanide solution, 35 ml of writer and 2 drops of sodium sulphide solution. Any colour produced should not be deeper than that given by the addition of 2 drops of sodium sulphide solution to 5 ml of solution containing 10 ml of standard lead solution (1 ml = 0.01 mg Pb) 2 g of ammonium acetate, 5 ml of dilute simmonia solution and 1 ml of potassium cyanide solution.

4 Copper.—To 10 ml of solution 2b add 2 ml of dilute acette acrd, 3 drops of pyridine, 1 ml of ammonium thioeyante solution and 2 ml of chloroform, shake vigorously and allow to separate. Any colour produced in the chloroformic layer should not exceed that given by 2 g ml of standard copper solution (1 ml = 001 mg (2u) and 1 g of ammonium acetate in 10 ml of water with the quantities of reagents used in the test and treated in the same manner.

5 Bismuth.—To 10 ml of solution 2b add to ml of dilute sulphure and and no 2g of solution zarde, then add r ml of potassum notide solution, shake and add 2 ml of ethyl acetate, again shake and allow to separate. Any yellow colour produced in the ethyl acetate layer should not exceed that given by 2 ml of standard bismuth solution (t ml = 00 or mg B)) and 2 g of ammonium acetate in an equal volume of solution containing the quantities of reagents used in the test and treated in the same manner

6 from —To 5 ml of solutions as add 5 ml of solution, and of doller hydrochloric acid and 1 drop of Nfto kMnO₄ mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a maxture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to esparate Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 ot mg Fe) in the same manner

- 7. Total Foreign Metals.—Heat 2:5 g. with 15 ml. of nutic acid on a water-bath until all the metal is oxidused, then evaporate to dryness; cool, digest with 3 ml of dalute nitric and and 30 ml. of water for 5 minutes and filter. Evaporate the filtrate to dryness, sgnute and weigh the residue. Not more than 1 mg. should be obtained.
- 8 Arsenic.—To 20 ml. of solution 2a, add 15 ml of hydrochloric acid and a few drops of stannous chloride solution and distil 25 ml. To the distillate add 40 ml of water and test as described in appendix 4. Any stain produced should not be greater than a 0 '002 mg, standard stain.
- 9 Antimony.—To the distillation residue from Test No 8 add 2 g, of tartane acid, 10 ml. of hydrochloric acid and dilute to 100 ml. with water. Add a loosely coiled piece of copper foil (15 × 100 millimetres) previously freed from grease and treated with a mixture of equal volumes of intric acid and water until a moderate reaction sets in, and subsequently washed with water. Boil the solution gently for 1 hour, replacing the water lost by evaporation. Any darkening of the foil should not be greater than that produced in a similar test containing 13 ml. of hydrochloric acid, 2 g, of tartatic acid and 0 5 ml. of standard antimony solution (1 ml. = 1 mg. Sb).

AñalaR

TITANYL POTASSIUM OXALATE

 $K_tT_tO(C_tO_t)_t.2H_tO = 354 16$

Maximum Limits of Impurities

Reaction			pH 30 to 36
Chloride (Cl)			o oor per cent
Sulphate (SO ₄)			o oz per cent
Nitrate (NO ₂)			o ooz per cent
Heavy Metals (Ph)			0 04 Per cent
Iron (Fe)			0.005 per cent.

- Description.—White crystals or a crystalline powder.
- Solubility.—Dissolve 1 g. m 50 ml. of water. A clear colourless solution should be produced.
- Reaction.—The reaction of a solution of 1 g. in 50 ml of carbon dioxide-free water should he between the limits of pH 30 and pH 36 using bromophenol blue as indicator
- 4. Chloride.—Dissolve i g in 50 ml of water and add 1 ml of dilute intitic acid and 1 ml of silver nutrate solution. No opalescence should be produced.
- 5. Sulphate.—Dissolve i g. in 10 ml. of water, add 10 ml. of dilute hydrochloric acid and i g of potassium permanganate in small portions and boil. Clear with 25 ml. of hydrogen perovide (20 volumes), add 10 ml.

TITANYL POTASSIUM OXALATE-continued

- of dilute ammonia solution, dilute with water to 50 ml. and filter through a No 41 Whatman filter paper To 25 ml of the filtrate add 2 ml of dilute hydrochloric seed and 2 ml of barmar chloride solution and allow to stand for 1 hour No turbudity or precipitate should be produced.
- 6 Nitrate.—Dissolve 1 g m to ml of water, add 1 ml, of standard indigo solution and 10 ml of sulphune acid and heat to boiling The blue colour should not entirely disappear
- 7 Heavy Metals.—Dissolve 0.5 g in 50 ml of water To 5 ml add 40 ml of water, 1 g of ammonium tarriate and 5 ml of dilute ammonia solution and pess hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 8 Iron—Dissolve 0.2 g m 3 ml of dilute sulphurie and and heat to boiling. Add 0.1 g of potass um permanganate and boil, followed by a 10 per cent aqueous solution of hydroxylamien hydrochloride drop by drop until the brown colour is discharged and then 2 ml in excess. Dilute to 20 ml with water, add 1 g of ammonium tatriate, 2 g of sodium acctate and 1 ml of a 0.5 per cent aqueous solution of o-phenanthroline. Allow to stand for 10 minutes. Any pink colour produced should not be great than that shown by 1 ml of standard iron solution (1 ml = 0.01 mg Fe) treated similarly
- 9 Assay.—Reflux 3 5 g with 20 ml of sulphurie said until decomposed. Cool, dilute with water to 250 oil. Set up a Jones reductor and reactivate the amalgam by passing a mixture of 40 ml of dilute sulphura and and 60 ml of water through the column followed by 100 ml of water.

 (a) Blank—introduce to ml of acid ferne ammonium sulphate.

(a) Blank—Introduce 50 ml of acid ferric ammonium sulphate solution anto the receiver flask of the reductor, pass 200 ml of N/1 H₂SO₄ through the column followed by 100 ml of water and nitrate the contents of the receiver with N/10 KMfiO₄

(b) Determination—Introduce 50 ml of acid ferric ammonium sulphate solution into the receiver, run 100 ml of N/t H₂SO₄ through the column, followed by 50 ml of the prepared solution diduted with 70 ml of with and 30 ml of dilute sulphuric acid. Then run through 100 ml of N/t 11₂SO₄ followed by 100 ml of water. Titrate the contents of the receiver flask with N/to kMnO₄ and deduct the value of the blank.

1 ml N/10 KMnO4 = 0 03542 g Kg F10(C2O4), 2H2O

Not less than 98 5 per cent should be indicated.

Acid ferric ammon um sulphate solution contains 150 g of ferric ammonium sulphate and 150 ml of sulphuric acid in 2 litre

NH, CH, C,H, CH, CH, NH, = 212 28

Maximum Limits of Impurities

Sulphated Ash Moisture

o 1 per cent

o r per cent

Sensitivity to Chlorine (CI) 1 50,000,000 minimum

- Description —White or cream coloured crystalline powder
- 2 Solubility.—Sightly soluble in water Dissolve 1 g in 20 ml of 95 per cent alcohol A clear solution should be produced
 - 3 Melting Point .- 128° to 130°
- 4 Sulphated Ash.—Morsten 2 g with sulphuric acid and ignite gently Not more than 2 mg of residue should be left
- 5 Moisture -Dry 5 g at 100° for 1 hour The loss in weight should not exceed 5 mg
- 6 Sensitivity.—Dissolve o 1 g in 10 ml of hydroehlong acid and dilute with freshly distilled water to 100 ml. To 50 ml of freshly distilled water containing 0 oc parts per million of free ehlorine, add 0 5 ml of the above solution of the sample and allow to stand for five minutes. A distinct yellow colour should be observed when compared with a similar volume of water containing the reagents above but with no added ehlorine.

ANALAR

CH, C.H. NH, = 107 15

Maximum Limits of Impurities

Sulphated Ash o-Toluidine 0 05 per cent 0 25 per cent

- 1 Description.—White crystals or crystalline powder, becoming coloured under the influence of light and air
- 2 Solubility.—Sparingly soluble in water Readily soluble in alcohol Dissole 5 g in a mixture of 10 ml of dilute hydrochloric acid and 20 ml of water. The warm solution should have no odour of mitrotoluene and on cooling to 10° no turbidity should be produced.
 - 3 Melting Point,-42° to 45°

ĸ

4 Sulphated Ash -- Moisten 2 g with sulphuric acid and ignite gently. Not more than r mg of residue should be left.

p TOLUIDINE-conti ued

- 5 o Toluidine—Shake 1 g with 20 ml of water add 2 drops of a 1 per cent aqueous solution of p-phenylenedizinine hydrochloride and 1 drop of ferric chloride solution—shake and observe immediately—There should be no transient green coforation.
- 6 Assay—Dissolve 0.4 g in 20 ml of water and 2 ml of fulute hydrochloric acid and dilute with water to 250 ml. To 25 ml of the solution in a stoppered bottle add 20 ml of water 50 ml of N/10 bromate-bromide solution and 10 ml of dilute hydrochloric acid. Leave to stand for ten minutes add a solution of 3 g of potssionm codid dissolved in 10 ml of water and utrate the liberated sodine with N/10 Na-S₂O₂ using starch as indicator. Run a blank on the reacents we'd

t ml N/10 bromate-bromude — o oor786 g CH₂ C₆H₄ NH₂ Not less than 99 per cent should be indicated

ANALAR TRICHLOROACETIC ACID

CCI, COOH = 163 40

Maximum Limits of Impurities

Non volatile Matter	ool per cent
Chloride (Cl)	o our per cent
Sulphate (SO ₄)	o ooı per cent
Nitrate (NO ₄)	o oo2 per cent
Phosphate (PO.)	o ooı per cent
Heavy Metals (Pb)	o con per cent
Year (Fe)	A ADDE DET CERT

- 1 Description —Colourless deliquescent crystals with a pungent odour
- 2 Solubility -- Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
 - 3 Freezing Point -- Not below 56°
- 4 Non-volatile Matter Ignite 10 g gently not more than 1 mg of residue should be left
- 5 Chloride —Dissolve 1 g tn 50 ml of water and add 1 ml of dilute nutric acid and 1 ml of siher nutrate solution. No opalescence should be produced.
- 6 Sulphate Dissolve 5 g in 10 ml of water and add 40 ml of a 0 5 per cent w/v solution of benzidioe in acctione. No opalescence or turbulty should be produced
- 7 Nitrate—Dissolve 1 g in 10 ml of water add 1 ml of standard indigo solution and 10 ml of sulphune and and heat to boiling. The blue colour should not entirely disappear.

- 8 Phosphate Dissolve I g in 20 ml of water add 3 ml of dilute sulphure acid I ml of phosphate reagent No 1 and 1 ml of phosphate reagent No 2 and place ne a water bath at 60° for 10 minutes Any blue colour produced should not be deeper than the standard colour defined in appendix 2
- 9 Heavy Metals and Iron—Dissolve 2 g in 40 ml, of water add 10 ml of dilute ammonia solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the standard colours defined in appendix 2
- 10 Assay —Dissolve 5 g in 50 ml of water and titrate with N/1 NaOH using phenol red as indicator

1 ml N/1 NaOH = 0 1634 g CCl2 COOH

Not less than 99 per cent should be indicated

ANALAR

TRIKETOHYDRINDENE HYDRATE

 C_4H_4 CO CO CO $H_2O = 178$ 14

Maximum Limit of Impurity

Sulphated Ash

o 1 per cent

Sensitivity passes test

- 1 Description —White to flesh-coloured crystals or crystalline powder
- 2 Solubility—Dissolve 1 g in 20 ml of water A clear solution should be produced
 - 3 Melting Point.—Not below 250°
- 4 Sulphated Ash -Moisten o 5 g with sulphuric acid and ignite gently Not more than o 5 mg of residue should be left
- 5 Sensitivity —Add o i ml of a o 25 per cent aqueous solution to i ml of a o-o2 per cent solution of amino acritic acid and heat on a water bath for fifteen minutes. A distinct purple colour should be produced.
- 6 Assay Weigh 0 5 g into a stoppered tube and add 20 ml of hydroxylamine hydrochloride-dimethyl yellow reagent and 5 ml of water Place in a water bath at 75° to 85° Neutralise the liberated acid at
- The reagent a prepared by dissolving 7 g of hydroxylamine hydrochloride n 05 ml oo per cent alcohol add ng 04 ml of damethyl yellow solution at outsing to the full yellow colour win h)x at schools c KOH and mak ng the rotume up to 100 ml

TRIKUTOHYDRINDENE HYDRATE-continued

5-munte intervals with NI₁ alcoholic KOH, and continue beating and neutralising until the reaction is at an end Carry out a duplicate determination and use the first reaction liquid plus a slight excess (o 2 ml) of the alcoholic hOH as a colour standard for the end point Correct the volume of NI KOH used by multiplying by the factor 1 co8

Not less than 95 per cent should be indicated

Chloride (CI)

ANALAR

URANYL ACETATE

Approximate formula UO₂(CH₂ COO)₂ 2H₂O = 424 19

Maximum Limits of Impurities

Sulphate (SO ₄)	o cos per cent
Heavy Metals (Pb)	0 004 per cent
Iron (Fe)	o ooz per cent
Calcium (Ca)	0 005 per cent
Alkalis and other Metals (as sulphates)	o 3 per cent
Ammonia	no reaction
Uranous Salt (U)	o I per cent

DOOL DET CENT

- r Description.-A bright yellow crystalline powder
- 2 Solubility—Dissolve 5 g in 45 ml of water and 5 ml of dilute acetic acid A clear yellow solution should be produced
- 3 Chloride.—Dissolve I g in 50 ml of water and I ml of dilute nitric acid and add I ml of silver nitrate solution. No opalescence should be produced
- 4 Sulphate Dissolve 2 g in 50 ml of water and 1 ml of dilute hydrochloric acid, add 1 ml of barium chloride solution and allow to stand for 1 hour. No turbulty or precipitate abould be produced
- 5. Heavy Metals and Iron —Pass hydrogen sulphide for a few seconds through the solution obtained in Test No 6 Not more than a very faint darkening should be produced
- 6 Calcium -Dissolve 1 g in 40 ml of water and 10 ml of ammonium carbonate solution A clear solution should be produced
- 7 Alkalis and other Metals,—Dissolve 2 g in 50 ml of water, heat to boiling and add 5 ml of dilute ammona solution. Filter, evaporate the filtrate to dryness moster with suphwire acid and ignite gently. Not more than 6 mg of residue should be obtained.
 - 8 Ammonia Dissolve 1 g in 10 ml of water, add 5 ml of

sodium hydroxide solution and boil No odour of ammonia should be perceptible

o Uranous Salt —Dissolve I g in 20 ml of water and 5 ml of dutte sulphure acid and add o r ml of Nf10 KMnO. The pink colour should not entirely disappear

10 Assay.—Dissolve o 7 g in 5 ml of sulphune and and heat until white fumes are evolved Cool, add 3 ml of nitne and and again heat to fuming Cool, mix with o ml of water and reheat to fuming Repeat this last procedure twice Cool and dilute with water to 100 ml. Set up a Jones reductor and reactivate the amalgam by passing a mixture of 40 ml of dilute sulphune and and 60 ml of water through the column followed by 100 ml of water

(a) Blank — Pass 200 ml of N/t H₂SO₄ through the column, followed by 100 ml of water, bubble an through the contents of the receiver flask

for to minutes and then titrate with N/to KMnO4

(b) Determination—Run 100 ml of N/1 H₃SO₄ through the column, followed by the prepared solution Then run through 100 ml of N/1 H₃SO₄, followed by 100 ml of water Bubble air through the contents of the receiver flask for 10 minutes, utrate with N/10 KMnO₄ and deduct the value of the blank

1 ml N/10 KMnO4 ≡ 002121 g UO2(CH3 COO)2 2H2O

Not less than 98 per cent should be indicated

AhalaR URANYL NITRATE

 $UO_3(NO_3)_3 6H_3O = 502 18$

Iron (Fe) 0 002 per cent
Calcium (Ca) 0 005 per cent
Alkalis and other Metals (as sulphates) 0 3 per cent
Armmonia Uranous Salt (U) 0 1 per cent
0 1 per cent

- I Description.-Brilliant yellow crystals with a greenish fluorescence
- 2 Solubility.--Readily soluble in alcohol and in ether Dissolve 5g in 50 ml of water, a clear yellow solution should be produced
- 3 Chloride Dissolve 1 g m 50 ml of water and 1 ml of difute nitric acid and add 1 ml of silver mtrate solution. No opalescence should be produced.

URANYL NITRATE-continued

- 4 Sulphate.-Dissolve 2 g in 5 ml of water and 1 ml of dilute hydrochloric acid, add I ml of banum chloride solution and allow to stand for 1 hour No turbidity or precipitate should be produced
- r Heavy Metals and Iron-Pass hydrogen sulphide for a few seconds through the solution obtained in Test No 6 Not more than a very faint darkening should be produced
- 6 Calcium -Dissolve 1 g in 40 ml of water and 10 ml of ammonium carbonate solution A clear solution should be produced
- 7. Alkalis and other Metals -Dissolve 2 g in 50 ml of syster, heat to boiling and add 5 ml of dilute ammonia solution Filter, evaporate the filtrate to dryness moisten with sulphuric acid and ignite gently Not more than 6 mg of residue should be obtained
- 8 Ammonia.-Dissolve 1 g in 10 ml of water, add 5 ml of sodium hydroxide solution and boil No odour of ammonia should be perceptible
- o Uranous Salt -Dissolve 1 g in 20 ml of water and 5 ml of dilute sulphuric acid and add o i mi of N/10 KMinO, The pink colour should not entirely disappear 10 Assay - Dissolve 09 g in 5 ml of sulphune acid and heat until
 - white furnes are evolved Cool mix with 10 ml of water and reheat to furning Repeat this last procedure twice Cool and dilute to roo ml Set up a Jones reductor and reactivate the amalgam by passing a mixture of 40 ml of dilute sulphuric acid and 60 ml of water through the column, followed by 100 ml of water
 - (a) Blank -Pass 200 ml of N/1 II-SO, through the column followed by 100 ml of water, bubble air through the contents of the receiver flask for 10 minutes and then titrate with N/10 KMnO.
- (b) Determination Run 100 ml of N/1 H2SO4 through the column, followed by the prepared solution then run through 100 ml of N/1 H.SO., followed by 100 ml of water Bubble air through the contents of the receiver flash for 10 minutes, titrate with N/to KMinO, and deduct the value of the blank

1 ml N/10 KMnO, = 0 02511 g UO2(NO3), 6H2O

Not less than 99 per cent should be indicated

UREA

$NH_2CONH_2 = 60 06$

Maximum Limits of Impurities

 Sulphated Ash
 0 sg per cent

 Chlorde (Cl)
 0 005 per cent

 Sulphate (SO₄)
 0 05 per cent

 Heavy Metals (Ph)
 0 0004 per cent

 Iron (Fe)
 0 0002 per cent

- 1 Description .- White crystals or crystalline powder
- 2 Solubility.—Readily soluble in alcohol Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Reaction.—Dissolve 1 g in 20 ml of water The solution should be neutral to htmus paper
 - 4 Melting Point,-131° to 133°
- 5 Sulphated Ash.—Moisten 1 g with sulphuric acid and ignite gently. Not more than 0.5 mg of residue should be left
- 6 Chloride.—Dissolve 2 g in 50 ml of water and add 1 ml of dilute nitric acid and 1 ml of silver nitrate solution. No opalescence should be produced
- 7 Sulphate.—Dissolve 2 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of barium chloride solution and allow to stand for 1 hour. No turbidity or precipitate should be produced
- 8 Heavy Metals and Iron.—Dissolve 5 g in 45 ml of water, add 5 ml of dilute ammona solution and pass hydrogen sulphide through the solution for a few seconds. Any colour produced should not be deeper than the "standard colours" defined in appendix 2
- 9 Assay.—Digest 1 g with 10 ml of sulphune acid in a Kyeldahl lask for two hours Cool, dulate with water, render alkalne with sodium hydrovide, distri and collect the distribute in 50 ml of 1½ H₂SO₄, and titrate the excess of acid with N₁: NaOH using methyl red as indicator Carry out a blank determination in the same manner.

1 ml N/1 H2SO4 = 0 03003 g NH2CONH2

Not less than 99 5 per cent should be indicated

ANALAR VANILLIN

C.H. OH OCH, CHO (4 3 1-) = 152 14

Maximum Limits of Impurities

Alcohol insoluble Matter

nil o or per cent

Sulphated Ash o or per

- r Description -- Colourless or faintly yellow, small accoular crystals with an atomatic odour
- 2 Solubility.—Dissolve 5 g in 50 ml of 90 per cent ethyl alcohol A clear yellow solution should be produced
 - 3 Melting Point -- 81° to 82°
- 4 Sulphated Ash Moisten 5 g with sulphune acid and ignite gently. Not more than 0 5 mg of residue should be left
- 5 Assay.—Dissolve 3 g in 50 ml of alcohol and titrate with N/2 alcoholic KOH using phenolphthalein as indicator

1 ml N/2 KOH = 0 07607 g C₆H₅ OH OCH₅ CHO Not less than 99 per cent should be indicated

ANALAR

WATER (Redistilled)

H,O = 18 016

Maximum Limits of Impurities					
Non volatile Matter Chlorsde (Cl) Sulphate (SO ₄) Nitrate (NO ₃) Lead (Pb)	5 parts per million of part per million i part per million o 2 part per million o 5 part per million o 05 part per million				
Copper (Cu) Iron (Fe) Manganese (Mn) Nickel (Ni) Cobalt (Co)	o o2 part per million o o5 part per million o4 part per million o2 part per million o5 part per million				
Zine (Zn) Calcium (Ca) Ammonia (NH _s) Oxygen absorbed (O)	o 2 part per multion 2 parts per multion o 02 part per multion o 68 part per multion				

1. Description.-A clear colourless odourless liquid

- 2 Reaction.—To o 2 ml of indicator solution (bromothymol blue or bromocresol purple), previously adjusted to the mid-point of its pH range and contained in a Nessler glass, add 50 ml of the water and compare the colour in similar Nessler glasses with standard buffer solutions containing the same proportions of indicator, evering down the length of the Nessler glasses against a white tile The pH value should not be lower than 5 s and not ingher than 75. A wate tolerance for the reaction of 'AMALAR' water is allowed because of the readiness with which water absorbs carbon dioxide
- 3 Non-volatile Matter and Calcium.—Evaporate 100 m¹ to dryness on a water-bath Not more than 0 5 mg of residue should be left
- 4 Chloride.—To 60 ml add 0 1 ml of N/1 Na_2CO_3 and evaporate until reduced to 10 ml. Transfer to a test-tube, add 0 2 ml N/1 HNO₃ and 0 1 ml of silver intrate solution. Any opalescence produced should not exceed that given by adding 0 1 ml of silver intrate solution to 10 ml of the same water containing 0 1 ml of N/1 Na_2CO_3 or ml N/1 HNO₃ and 0 or ml of standard chloride solution (1 ml = 0 1 mg Cl)
- 5 Sulphate.—To 50 ml add 0.5 ml of dilute hydrochloric acid and 5 ml of barum chloride solution and allow to stand for 15 minutes. No turbudity should be produced
- 6 Nitrate,—To 2 5 ml add 1 5 ml of diphenylbenzadne reagent and 6 ml of nitrogen free sulphuric acid. On mixing no blue colour should be produced.
- 7 Metals.—(a) To 50 ml contained in a Nessler glass add 1 ml of dilute ammonia solution and 1 ml of a 1 per cent aqueous solution of sodium diethyldithiocarbamate No colour or turbidity should be produced.
- (b) Shake vigorously 25 ml in a stoppered test-tube of lead-free glass with 0 i ml of potassium cyanide solution and 25 ml of a ocor per cent w/v solution of diphenylthiocarbazone in carbon tetrachloride and allow to separate. The lower layer should not be red or pink
- to separate 1 he lower layer should not no rea or pink
 (c) To 50 ml add 1 ml of glacial acetic acid and 3 ml of strong
 ammonia solution and pass hydrogen sulphide through the solution for a
- ammonta solution and pass hydrogen sulpride through the solution for a few seconds. No colour should be produced
- 8 Ammonia.—To so ml add 2 ml of Nessler's reagent, mix and allow to stand for 15 minutes No yellow colour should be produced
- 9 Oxygen Absorption —To see ml add x ml of dilute sulphunc and and oos ml of N/10 KMnO, and heat to boiling The pink colour should not entirely disappear

ANALAR

ZINC

Zn = 6s 28

Maximum Limits of Impurities

Acid insoluble Matter Iron (Fe)

passes test 0 002 per cent 0 0008 per cent

Iron (Fe)
Oxidisable Impurities (O)
Arsenic (As.O.)

o 00001 per cent (o 1 part per million)

Sensitivity in arsenic test passes test

- Description —A bright silver grey metal in granulated form, or as pellets shot or sticks
- 2 Acid-insoluble Matter,—Dissolve 5 g in 20 ml of hydrochlone acid diluted with 20 ml of water A clear colourless solution free from more than traces of insoluble matter should be obtained
 - 3 Iron.—Dissolve o 5 g in 4 ml of ddute hydrochloric and add 7 ml of water and z drop of N/10 kMnO₄, mix add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (r ml ⇒ 0 or mg Fe) in the same manner
- 4 Oxidisable Impurities.—Dissolve to g in 50 ml of water and 15 ml of sulphune acid m a flask from which air is excluded, when solution is complete, add 0 t ml of N/to KMnO₄. The pink colour should persist for at least 5 minutes.
- 5 Arsenic.—Test as described in appendix 4 using 20 g of the sample, 50 ml of hydrochloric acid of 3 ml of stannous chloride solution and 250 ml of water and allow the reaction to proceed for I hour. Any stain produced should not be greater than a 0 002 mg standard stain.
- 6 Sensitivity -- Carry out the procedure for the production of 0 001 mg and 001 mg standard areane stuns described in appendix 4 A famt yellow stans should be produced in the former case, and a normal stain in the latter case

ANALAR

ZINC ACETATE

 $(CH_2 COO)_2 Zn 2H_2 O = 219 50$

Maximum Limits of Impurities

1 Description.—Colourless or white crystals with a faint odour of acetic acid

- 2 Solublity.—Dissolve 5 g in 50 ml of water A clear colourless solution should be obtained
- 3 Chloride.—Dissolve I g in 50 ml of water and add I ml of dilute nitric acid and I ml of silver intrate solution. No opalescence should be produced.
- 4 Sulphate.—Dissolve i g in 50 ml of water, add i ml of dilute hydrochloric acid and i ml of barium chloride solution and allow to stand for i hour. No turbidity of precipitate should be produced.
- 5 Lead—Dissolve 0 5 g in 10 ml of water and 5 ml of dilute acetic acid, add 20 ml of zine aminonium acetate solution, 10 ml of dilute aminoma solution and 1 ml of potassium cyanide solution, mix, and add 5 ml of hydrogen sulphide solution (one-tenth saturated). Any colour produced should not be deeper than that produced by the addition of 5 ml of the same hydrogen sulphide solution to 45 ml of solution containing 2 ml of standard lead solution (1 ml = 0 o1 mg. Pb) and the quantities of reagents used in the test
- 6 Iron —Dissolve 2 g in 7 ml of water and add 4 ml of dilute hydrochloric acid and 1 drop N/to KMnO4, mix, add 5 ml of ammonium thiocyanate solution and io ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 ml standard iron solution (1 ml = 0 or mg Fe) in the same manner.
- 7 Arsenic.—Dissolve 2 g in 12 ml of brominated hydrochloric acid and 50 ml of water, add a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a 0 01 mg standard stain.

(Continued overleaf)

ZINC 4CETATE-continued

- 8 Sodium —Dissolve 2.5 g in 3 mi of uranyl acetate solution and 7 ml of water, add 10 ml of alcohol and allow to stand for 1 hour No turbidity or precipitate should be produced
- o Other Metals ... Dissolve 2 g in 100 ml of water, add 15 ml of dilute ammonia solution and allow to stand for 30 minutes The solution should remain clear and colourless.
- ro Assay —Dissolve 1 g in 10 ml of water, add 25 ml of sodium hydrovide solution and attr until the solution clears. Dilute to 150 ml with water and electrolyse the solution for 1 hour with a current of 3 amperes, using a weighed copper plated platinum cathode, as described in appendix 5. Wash the cathode with water, then with acctone, dry and weigh

Weight of Zn × 3 357 = weight of (CH₃ COO)₂Zn 2H₂O

Not less than 99 per cent and not more than 102 per cent should be indicated

ANALAR

ZINC OXIDE

2nO = 8t 38

Maximum Limits of Impurities

And insoluble Matter nıl Chloride (Cl) o ooz per cent Sulphate (SO₄) 100 per cent Carbonate passes test Metallic Zinc passes test Lead (Pb) per cent Iron (Fe) o ooos per cent Oxidisable Matter (O) o coz per cent Arsenic (As,O.) o goos per cent (5 parts per million)

- I Description.—A white amorphous powder
- 2 Solubility —Insoluble in water Dissolve 5 g in 40 ml of dilute hydrochlone and and 10 ml of water, a clear colourless solution should be produced
- 3 Chloride Dissolve 5 g in 30 ml of dilute nitric acid and 20 ml of water and add 1 ml of silver nitrate solution. Any opalescence produced should not be greater than the "standard opalescence" defined in appendix 2
- D stolke 0.5 g of uranyl acetate AnalaR in 10 ml of water heat to boiling and add 1.5 ml of dilute ammonia solution. Fifter wash the precip tate with hot water and dissolve lang and of dulute acetic acet.

- 4 Sulphate.—Dissolve I g in 45 ml of water and 6 ml of dilute hydrochloric acid, add I ml of barnum chloride solution and allow to stand for I hour. No turbulty or precipitate should be produced
- 5 Carbonate and Metallic Zinc.—Dissolve 5 g in 50 ml of dilute hydrochloric acid containing 1 drop of lead acetate solution No effervescence should take place and the resulting solution should be clear and free from any black particles
- 6 Lead.—Dissolve 0 5 g in 10 ml of water and 5 ml of dilute actic acid, add 20 ml of zinc ammonium acetate solution, 10 ml of dilute ammonia solution and 1 ml of potassium cyanide solution, mix and add 5 ml of hydrogen sulphide solution (one-tenth saturated). Any colour produced should not be deeper than that produced by the addition of 5 ml of the same hydrogen sulphide solution to 45 ml of solution containing 5 ml of standard lead solution (1 ml = 0 or mg Pb) and the quantities of reagents used in the test
- 7 Iron.—Dassolve I g in 6 ml of dibite bydrochloric acid and 5 ml of water and add I drop of N/Ito KMnO₄, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcohol and amyl acetate, shake vigorously and allow to separate Any colour produced in the upper layer should not be greater than that produced by treating 0 5 ml of standard iron solution (t ml = 0 0 i mg Fe) in the same manner
- 8 Oxidisable Matter.—Triturate 5 g with 30 ml of water and 0.25 g of ferric ammonium sulphate. Add 75 ml of water and 5 ml of sulphune acid, warm to dissolve if necessary. Cool and add 0.15 ml of N/10 KMnO₄. The pink colour should persist for 15 minutes.
- 9 Arsenic.—Dissolve 2 g in 12 ml of brominated hydrochloric acid and 50 ml of water, add a few drops of stannous chloride solution and test as described in appendix 4. Any stain produced should not be greater than a 0 of mg standard stain
- 10 Assay.—Dissolve 0.2 g of the freshly ignited material in 5 ml of dilute sulphuric and and 10 ml of water. Add 25 ml of sodium hydrox die solution and stu truth the solution clears. Dilute to 150 ml with water and electrolyse the solution for 1 hour with a current of 3 amperes, using a weighed copper-plated platinum cathode, as described in appendix 5 Wash the rathode with water, then with actione, dry and weigh

Weight of Zn x 1 2447 = weight of ZnO

Not less than 99 5 per cent. should be indicated.

ANALAR ZINC POWDER

$Zn \approx 65.18$

Maximum Limits of Impurities

Acid insoluble Matter passes test
Iron (Fe) 0 004 per cent
Oxidasable Impurities (O) 0 0008 per cent

Nitrogen (N) 0 02 per cent

- r Description —A fine grey powder free from all but small aggregates
- 2-4 Tests for Acid-insoluble Matter, Iron and Oxidisable Impurities are carried out as described for Zinc, except that in Test 3 (Iron) 0.25 g should be used
- 5 Nitrogen —Treat 2 g with 100 ml of sodium hydroxide solution in an ammonia distillation apparatus and dustil 50 ml, collecting the distillation 25 ml of Nivo H₂SO₄. Turate the excess of said with Nivo NaOH, using methyl red as indicator. Carry out a blank determination in the same manner. The difference between the two utrations should not exceed 30 ml.
- 6 Assay—Shake r g with 25 g of ferric ammonium sulphate and too ml of water in a vessel from which the air has been displaced by cathoo dioxide, until the aims is completely dissolved. Add go ml of dilute sulphune acid dilute to goo ml with water, and titrate go ml of this solution with N/to NMOQ.

1 ml N/10 KMnO4 = 0 003269 g Zn

Not less than 95 per cent should be indicated

ANALAR ZINC SULPHATE

 $ZnSO_47H_4O = 287.56$

Maximum Limits of Impurities

Chloride (Cl) 0 0 001 per cent
Nitrate (NO₃) 0 001 per cent
Heavy Metals (Pb) 0 001 per cent
Iron (Fe) 0 002 per cent
Armonus (NH₃) 0 001 per cent
Arsenic (As₂O₃) 0 0001 per cent
(r part per mullion)

- I Description.—Colourless crystals
- 2 Solubility.—Dissolve 5 g in 50 ml of water A clear colourless solution should be produced
- 3 Reaction.—A 10 per cent aqueous solution should oe neutral to methyl red
- 4 Chloride.—Dissolve 1 g m 50 ml of water and add 1 ml of dilute nutric acid and 1 ml of silver nutrate solution. No opalescence should be produced.
- 5. Nitrate.—Dissolve 2 g in 10 ml of water, add 1 ml of standard indigo solution and 10 ml of sulphuric acid and heat to boiling The blue colour should not entirely disappear
- 6 Heavy Metals.—Dissolve 1 g in 30 ml of water, acidify with 5 ml of dilute acetic acid, render alkaline with 10 ml of dilute ammonia solution and add 5 ml of hydrogen sulphide solution (one-tenth saturated). No immediate darkening should be produced.
- 7. Iron.—Dissolve 0 5 g in 10 ml of water and add 1 ml of dilute hydrochloric acid and 1 drop of N/10 KMinO₂, mix, add 5 ml of ammonium thiocyanate solution and 10 ml of a mixture of equal volumes of amyl alcobol and amyl accrate, shake vigorously and allow to separate. Any colour produced in the upper layer should not be greater than that produced by treating 1 ml of standard iron solution (1 ml = 0 or mg Fe) in the same manner
- 8 Ammonia.—Dissolve 1 g m 45 ml of water, add 5 ml of sodium hydroxide solution and 2 ml of Nessler's reagent Any collow produced should not exceed that given by the addition of 5 ml of sodium hydroxide solution and 2 ml of Nessler's reagent to 45 ml of water containing 1 ml of standard ammonia solution (1 ml = 0 or mg NH₂)
- 9. Arsenic.—Dissolve 10 g in 50 ml of water, add 10 ml of stannated hydrochlone acid and test as described in appendix 4. Any stam produced should not be greater than a 0-01 mg standard stam.
- 10 Assay.—Dissolve 1 g in 10 ml of water, add 25 ml of sodium hydroxide solution and stir until the solution clears. Dilute to 150 ml with water and electrolyse the solution for 1 hour with a current of 3 amperes, using a weighed copper-plated platinum cathode, as described in appendix 5. Wash the cathode with water, then with acetone, dry and weigh

Weight of Zn × 4 398 = weight of ZnSO4 7H2O

Not less than 990 per cent, and not more than 1005 per cent, should be indicated

APPENDIX 1

(a) REAGENTS USED IN TESTING 'ANALAR' CHEMICALS

The chemicals and the water employed in the preparation of the following reagent solutions should comply with the requirements of the 'Analar' specifications, where such are available. The quantities used for the solutions of solid salts refer to the salt in the state of hydration prescribed in these specifications.

ACETIC ACID, DILUTE (approximately 5N)

Acetic acid glacial 285 ml Water to produce 1000 ml

ALCOHOL.

Ethyl alcohol (90 per cent)

AMMONIA SOLUTION, STRONG (approximately 18N)

Ammonia solution AnalaR (sp gr o 880)

Ammonia Solution Dillute (approximately 5N)

Ammonia solution strong 280 ml

Water to produce 1000 ml

Ammonium Acetate Solution (approximately M)
77 g per litre

AMMONIUM CARBONATE SOLUTION (approximately 5N)

Ammonium carbonate 200 g
Ammonia solution dilute 250 ml
Water to produce 1000 ml

Ammonium Chloride Solution (approximately 2M)

107 g per litre

Ammonium Nitro molybdate Solution

Molyhdic acid 125 g
Ammonia solution, strong 75 ml
Water 325 ml

Dissolve and add

Ammonium nitrate 400 g
Water to produce 1000 ml

then add a mixture of
Nitric acid 380 ml
Water 520 ml

Allow to stand at 35° for 24 hours and filter

Ammonium Oxalate Solution (approximately 0 25 M)

35 g per litre

Ammonium Phosphate Solution (approximately M)

132 g per litre

```
Ammonium Thiocyanate Solution (approximately 7 5M)
          570 g per litre
BARIUM CHLORIDE SOLUTION (approximately o 531)
          122 g per litre
BARIUM NITRATE SOLUTION (approximately o 25M)
          65 g per litre
BROMINATEO HYDROCHLORIC ACID
          Bromine solution
                                                to mi
          Hydrochloric acid
                                   to produce 1000 ml
BROMINE SOLUTION
          Bromine
                                               too ml
          Potassium bromide
                                               300 g
                                   to produce 1000 ml
CADMIUM IOOIOE SOLUTION (approximately o 25M)
          92 g per litre
CALCIUM CHLORIDE SOLUTION (approximately o sM)
          110 g per litre
CALCIUM SULPHATE SOLUTION
          A saturated aqueous solution
CUPRIC SULPHATE SOLUTION (approximately o 5M)
          125 g per litre
DIPHENYLAMINE REAGENT
          Diphenylamine
                                               80 mg
          Water
                                               20 m
          Sulphuric scid (nitrogen free)
                                               60 ml
DIPHENYLBENZIDINE REAGENT
          Diphenylbenzidine
                                                8 me
                                                5 ml
           Sulphuric acid (nitrogen free)
                                               45 ml
FEHLING 8 SOLUTION
    No 1 Cupric sulphate
Sulphuric acid
                                              34 64 g
                                               o 5 ml
                                    to produce 500 ml
           Water
    No 2 Sodium potassium tartrate
                                               176 g
          Sodium hydroxide
           Water
                                    to produce 500 ml
FERRIC AMMONIUM SULPHATE SOLUTION (approximately o 2M)
          96 g per litre
FERRIC CHLORIDE SOLUTION (approximately o 33M)
          90 g of ferric chloride (hydrated) per litre
HYDROCHLORIC ACID (approximately 11N)
```

Hydrochloric acid 'AnalaR' (sp gr 1 18)

```
Hydrochloric Acid, 20 per cent.
```

Hydrochlone acid (sp gr. 1 18) . 100 ml Water 00 ml

HYDROCHLORIC ACID, DILUTE (approximately 5N)

Hydrochloric acid (sp gr 1 18) 430 mi Water to produce 1000 ml

HYDROXYLAMINE HYDROCHLORIDE REAGENT

Hydroxylamine hydrochloride ro g Ethyl alcohol (90 per cent) 500 ml Bromophenol blue solution ro ml

Water to produce 1000 ml
Dissolve and add sufficient N/10 NaOH to produce a greenish
colour

LEAD ACETATE SOLUTION (approximately o 25M)

95 g per litre

NESSLER'S REAGENT

Dissolve and add a cold saturated solution of mercuric chloride until a slight permanent precapitate is produced, then add Sodium hydroxide 120 g

Dissolve, add a little more mercuric chloride solution and sufficient water to produce 1000 ml

Shake occasionally for several days, allow to settle and decant the clear liquid for use

NIOXIME SOLUTION

A saturated (about o 85 per cent) solution of r 2-cyclohexanedione dioxime in water

NITRIC ACID (approximately 16N)

Nitric acid 'AnalaR' (sp gr 142)

NITRIC ACID, DILUTE (approximately 5N)

Nitric acid (sp gr 1 42) 320 ml Water to produce 1000 ml

m Phenylenediamine Sulphate Solution

25g per litre

PHOSPHATE REAGENT

No 1 Ammonium molybdate (powdered)

N/1 Sulphute acid

Dissolve without heat

ino mi

No. 2 N-Methyl-p-aminophenol sulphate (Metol)

Dissolve without heat

POTASSIUM CHROMATE SOLUTION (approximately o 25M)

49 g per litre

POTASSIUM CYANIDE SOLUTION (approximately 1 5M)

_ too g per litre

POTASSIUM FERRICYANIDE SOLUTION

A 1 per cent aqueous solution, freshly prepared, from crystals previously rinsed with water

POTASSIUM FERROCYANIDE SOLUTION (approximately o 1M)
42 g per litre

POTASSIUM IODIDE SOLUTION (approximately M)

166 g per litre

POTASSIUM PLUMBITE SOLUTION

Lead acetate
Potassium citrate
Potassium hydroxide

1 7 g 3 4 g 50 g to produce 100 ml

SCHIFF'S REAGENT

Water EAGENT Magenta Water

600 ml

Dissolve, cool in an ice-bath and add 20 g of sodium sulphite dissolved in 100 ml of water. Cool again in an ice-bath and slowly add 9 ml of hydrochloric acid with surring. Didute to 1 little If the solution is turbid, fifter. If it has a brown colour add a little decolorising charcoal and fifter immediately. A slight residual red colour may be destroyed by the addition of 2 to 3 ml more of hydrochloric acid. Allow the completed solution to stand overnight before use.

SILVER NITRATE SOLUTION (approximately o 25M)

42 g per litre

SODIUM HYDROXIDE SOLUTION (approximately 5N)

200 g per litre

SODIUM SULPHIDE SOLUTION (approximately o 5M)

120 g per litre

STANNATED HYDROCHLORIC ACID

Stannous chloride solution . 10 ml Hydrochloric acid to produce 1000 ml STANNOUS CHLORIDE SOLUTION

Stannous chloride

Hydrochlone acid Water

Im out to produce tooo mi

330 E

Sulphuric Acid (approximately 36N) Sulphuric and 'Away aR'

SULPHURIC ACID, DILUTE (approximately 5N)

Sulphuric acid Water

136 ml to produce 1000 ml

ZING AMMONIUM ACETATE SOLUTION

Zinc oxide

100 g Acetic acid, glacial 200 m1 Water 200 mi

Dissolve and add

Ammonia solution strong Water

200 ml to produce 1000 ml

then add 5 ml of sodium sulphide solution, digest on a water bath for several hours and filter through filter paper pulp

(b) INDICATOR SOLUTIONS •

BROMOCRESOL GREEN pH 36-52

Warm 0 1 g with 2 0 ml of N/20 N2OH and 5 ml of alcohol until dissolved dilute with 20 per cent alcohol to produce 250 ml

BROMOCRESOL PURPLE pH 5 2-68

Warm o I g with 5 ml of alcohol until dissolved, dilute with 100 ml of 20 per cent alcohol, add 3 7 ml of N/20 NaOH and sufficient 20 per cent alcohol to produce 250 ml

BROMOPHENOL BLUE pH 28-46

Warm o 1 g with 3 o ml of N/20 NaOH and 5 ml of alcohol until dissolved, dilute with 20 per cent alcohol to produce 250 ml

BROMOTHYMOL BLUE pH 60-76

Warm o 1 g with 3 2 ml of N/20 NaOH and 5 ml of alcohol until dissolved, dilute with 20 per cent alcohol to produce 250 ml

DIMETRIAL VELLOW \$H 28-46

Dissolve o 2 g in 100 ml of 90 per cent alcohol

METHYL ORANGE pH 28-46

Dissolve 0 04 g in 100 ml of 20 per cent alcohol METHYL RED bH 42-63

Warm 0 025 g with 0 95 ml of N/20 NaOH and 5 ml of alcohol until dissolved, dilute with 50 per cent alcohol to produce 250 ml

Industrial sleehol may be used for preparing these solutions which are in accordance with the formulæ given in the British Pharmacopæis 1948

O PHENANTHROLINE FERROLS COMPLEX

Dissolve o 7 g of ferrous sulphate in 70 ml of water add 1 5 g of o phenanthroline and dilute with water to 100 ml

PHENOLPHTHALEIN pH 8 3-10-0

Dissolve o 2 g in 60 ml of 00 per cent alcohol and add 40 ml of water

PHENOL RED #H 68-84

Warm 0.05 g with 2.85 ml of N/20 NaOH and 5 ml of alcohol until dissolved dilute with 20 per cent alcohol to produce 250 ml STARCH

Mix o 5 g of soluble starch with 5 ml of cold water, add with constant stirring 95 ml of boiling water and heat in a boiling water bath for 5 minutes

THYMOL BLUE pH 80-96

Warm o 1 g with 43 ml of N/20 NaOH and 5 ml of alcohol until dissolved dilute with 20 per cent alcohol to produce 250 ml

THYMOLPHTHALEIN pH 93 105

Dissolve o 2 g in 60 ml of 90 per cent alcohol and add 40 ml of water

o TOLIDINE

Dissolve on g of o tolidine in 10 ml of hydrochloric acid and dilute with water to 100 ml

(c) STANDARD SOLUTIONS

ALUMINIUM I ml = 0 I mg Al

1 68 g

Ammonium alum Water

to produce 1000 ml

AMMONIA I ml = 0.01 mg NH3

Ammonium chloride

to produce 1000 ml

Water

Dilute this solution one hundred times with water immediately

before use

ARSENIC I ml = 0 oi mg As2O3 Amenious oxide

Hydrochloric acid

50 ml

Water

3 00 I to produce 1000 ml

Dilute this solution one hundred times with water immediately before use

BISMUTH I ml = 0-01 mg Bi

Dissolve o to g of finely powdered hismuth in 25 ml of hot sulphurie acid cool and dilute with water to produce 1000 ml

Dilute this solution ten times with water immediately before use

25 g

BROMIDE BROMATE N/ro

Potassium bromide Potassium bromate (finely powdered

and dried at 110° for 1 hour) 2 784 g Water to produce 1000 ml

CHLORIDE I ml = 0 I mg CI

N/10 Hydrochloric acid 28 2 ml to produce 1000 ml

COBALT rml = o or mg Co

Cobalt chloride Hydrochloric acid

4 05 g 50 ml to produce roop mi

Dilute this solution one hundred times with water immediately hefore use

COPPER I ml = I mg Cu

Cupric sulphate 3 93 g Sulphuneacid Water to produce 1000 ml

COPPER I ml = 0 of mg Cu

Dilute standard copper solution (1 ml = 1 mg Cu) one hundred times with water immediately before use

INDIGO I ml = 0 02 mg NO,

Dissolve 0.2 g of indigo carmine in 500 ml of dilute sulphuric scid, add 20 ml of hydrochloric acid and sufficient dilute sulphuric acid to produce 1000 ml Standardise the solution so that 10 ml added to 3 3 ml of M/1000 KNO is just decolorised on adding 13 ml of sulphuric acid and heating to boiling

Iron i ml = o oi mg Fe (ic)

Ferric ammonium sulphate 8 65 g Nitric acid so mi

Water to produce 1000 ml

Dilute this solution one hundred times with water immediately before use

Lead 1 ml = 1 mg Pb

Lead nitrate и бо в Nitric acid 50 ml Water to produce 1000 ml

LEAD 1 ml = 0 or mg Pb

Dilute standard lead solution (1 ml = 1 mg Pb) one hundred times with water immediately before use

MAGNESIUM I ml = 0 I mg Mg

Magnesium sulphate Dilute sulphuric acid Water

1.00 g 5 ml to produce 1000 ml

PHOSPHATE I ml == 0 or mg PO.

Potassium dihydrogen phosphate 1 43
Water to produce 1000 ml

Store in a waxed hottle

Dilute this solution one hundred times with water immediately before use

SULPHATE 1 ml = 0 1 mg SO4

N/10 Sulphuric acid

20 8 ml to produce 1000 ml

ZINC I ml = I mg Zn

Dissolve 1 00 g of zinc in a slight excess of hydrochloric acid and dilute with water to 1000 ml

Zinc rml = oormg Zn

Dilute standard zinc solution (1 ml = 1 mg Zn) one hundred times with water immediately before use

ZING AMMONIUM CHLORIDE M/10

Dissolve 6 538 g of zinc in a slight excess of hydrochloric acid, add 5 g of ammonium chloride render alkaline with ammonia and dilute with water to produce 1000 ml

APPENDIX 2

PREPARATION OF STANDARD COMPARISON SOLUTIONS

Standard Opalescence

To 50 ml of water add 1 ml of standard chloride solution {1 ml = 0 1 mg Cl} 1 ml of dilute nitre acid and 1 ml of sliver nitrate solution Mix and use as a comparison standard after 5 minutes

Standard Turbldity

To 8 ml of water add z ml of standard sulphate solution (1 ml \approx 0 t mg SO₁), 0 z ml of N/1 Na₂CO₂ t z ml of N/1 HCl and 1 ml of barrum chloride solution Mix and use as a comparison standard after 5 minutes

Standard Colours for Heavy Metals and Iron

(a) Mix 2 ml of standard lead solution (1 ml = 0.01 mg Pb) with 1 ml of glacial accitic acid, 10 ml of dilote ammonia solution and sufficient water to produce 50 ml, then pass hydrogen sulphide through the solution for a few seconds

(b) Mix 1 ml of standard iron solution (t ml = 0-01 mg Fe) with 1 ml of glacial acetic acid, 10 ml of dilute ammonia solution and sufficient water to produce 50 ml, then pass hydrogen sulphide through

the solution for a few seconds

The Standard Colour is (1) that of solution (a) or (2) that of solution

(b) or (3) that of 50 ml of any maxtore of these two solutions

The solutions are conveniently viewed in Nessler glasses against a white background

Standard Colour for Phosphate

Mix 1 ml of standard phosphate solution (1 ml or mg PO₄) with 20 ml of water, 3 ml of oldute sulphune acid, 1 ml of phosphate reagent No 2 and place in a water-hath at 60° for 10 minutes.

Standard Colour for Silicate

Aftx 1 ml of standard phosphate solution (1 ml = 0 or mg PO₄) with 20 ml of water, 1 ml of dulute sulphuric acid 1 ml of phosphate reagent No 1 and 1 ml of phosphate teagent No 2 and place in a waterbath at 60° for 10 minutes The blue colour obtained 15 of the same intensity as that yielded by 0 cog mg of SiO₄ when similarly treated

APPENDIX 3

THE LIMIT TEST FOR WATER

Karl Fischer Reagent

Forty-five grams of dry sodue are added to an anhydrous maxture of 250 ml of methyl alcohol and 80 ml of pryndue contained in a dry gas wash bottle, the delivery tube being fitted with a screw clip rund the ext limb connected to an efficient drying tube. The maxture is gassed with study sulphur dioxide until 20–22 g has dissolved. The reagent should be stored under moisture free conditions and should be standardised by iteration against a standard solution of water in methyl alcohol. Karl Fascher reagent prepared as described above will initially have a water equivalent of about 5 mg per ml, but it should be re-standardised at frequent intervals as, apart from its extreme sensitivity to moisture, it undergoes slow but continual autodecomposition.

Titration with Karl Fischer Reagent

The titration is carried out in a vessel completely protected from atmo spheric moisture and provided with a mechanical stirrer. The end point is detected by the u e of a potentiometric circuit employing a polarised pair of bright platinum electrodes

APPENDIX 4

THE LIMIT TEST FOR ARSENIC

The apparatus consists essentially of a glass tube, 200 millimetres long with an internal diameter of 65 millimetres, the upper end is crud off equare and ground smooth, while the lower end is drawn out to a diameter of about 1 millimetre, and a hole about 2 millimetres in diameter is blown in the side of the tube where it is constricted

The tube is fitted by means of a rubber bung into a wide mouthed bottle of about 120 ml capacity in such a manner that the hole in the side of the tube is clear of the underside of the bung and the end of the drawn out portion is clear above the surface of the liquid in the bottle

Alternatively, a conical flask may be used in place of the wide mouthed bottle, and the tube may be fitted with a ground glass joint in place of the rubber bung

A piece of white filter paper, 100 × 50 millimetres, which has been soaked in a 10 per cent aqueous solution of lead acetate and drad, is rolled up and placed in the tube so that the upper portion is about 25 millimetres below the top of the tube The function of the lead paper is to absorb traces of hydrogen sulphide from the issuing gases.

A piece of white filter paper, previously soaked in a saturated aqueous solution of mercustic chloride, pressed to remove superfluous fluid, and dried, is placed over the upper end of the tube and held in position in such a manner that the whole of the issuing gas passes through a circle of paper 65 millimetres in diameter

Method of Performing the Test

A weighed quantity of the substance is dissolved in 50 ml of water and 10 ml (or the specified amount) of stannated bydrochloric acid is added. This is placed in the wide mouthed bottle (or flash), 10 g of gramulated zinc is added and the glass tube containing the lead paper and fitted with the mercuric chloride paper is placed in position. The apparatus is allowed to stand in a warm place, such as on a hot plate, so that a steady but not too vigorous evolution of gas is obtained. A temperature of from 40° to 60° is usually suitable. The reaction is allowed to proceed for about 40 minutes, care being taken that the mercuric chloride paper is not exposed to bright suilable.

The stain produced on the mercuric chloride paper is compared with stains produced in the same manner from known quantities of arsenic The most useful standards for comparison are those produced by quantities of arsenic ranging from oool mg to ool mg of 8x₂O₂. These standard stains are obtained by carrying out the test using 50 ml of water, 10 ml of stannated hydrochloric acid and quantities varying from 0 1 ml to 1 on ml of standard arsenic solution (17ml = 0 ol mg As₂O₃). These stains fade on keeping and freshly prepared standards only should be used.

If the substance to be tested is insoluble in water, but soluble in hydrochloric acid, it is dissolved in sufficient stannated hydrochloric acid to leave an excess of io ml for reacting with the zine, and the test is then carried out in the usual manner. If the substance is strongly alkaline and a vigorous reaction takes place on addition of acid, brominated hydrochloric acid is used to prevent any loss of arsenic, and the bromine is finally removed by the addition of a cive drops of stannous chloride solution. Where special treatment is necessary, full details are given in the text

Fresh lead paper should be used for each test, and the tubes must be kept dry and scrupulously clean. The mercune chloride papers should be carefully preserved in a well stoppered bottle and protected from light and from animonia.

APPENDIX 5

ELECTRODEPOSITION OF METALS

Apparatus

The electrodes employed should be of the concentric cylindrical platinum gauze or similar type, suitable for rapid electrolysis with stirring

Protective Plating

For protective plating of the cathode, the following solution should be used. Dissolve 0.5 g of cupric sulphate in 150 ml of water, add a few drops of sulphuric acid and a few drops of nitric acid and pass a current of 2 amperes for about 1 minute, surning as usual

"ANALOIDS"

By the courtesy of Messrs Rudsdale & Co, Analytical and Consulting Chemists, Middlesbrough, the owners of the trademark "Analoid", the word 'Analark' has been registered as a distinctive name for the Analytical Reagents prepared and issued by The British Drug Houses Ltd and Hopkin & Williams Ltd

The term "Analoid" was registered by Mr C H Ridsdale, FIC, a Director of Messrs Ridsdale & Co, in connection with a system of analysis patented by him in 1906 This system had for its object the attainment of a higher degree of accuracy in the routine analysis of iron, steel and other metals, and at the same time a reduction in the time required for the analysis.

The main features of the Analoid system are -

(t) The substitution of various operations, involving filtration and neutralisation, by a simpler technique in which compressed tablets of certain chemical reagents (termed "Analoids") of stated composition are used

(2) The standardisation of the operations in such a manner as to ensure uniformity of procedure and increased accuracy

The advantage of the Anaload system is the ease and rapidity with which a large number of analyses of various types of material may be carried out under fixed conditions, such as the addition of exact quantities of reagents, the controlling of the degree of acidity and temperature, and the limitation of the volume of liquid and the period of the reaction Specially constructed apparatus is used in certain cases and this contributes to the simplification of the tests. The operations are based throughout on practical experience and mature judgment

The purity of the chemicals used in the manufacture of Analoids is controlled by analysis before and after compression into tablet form in order to ensure that they are suitable for the particular purposes for which they are prepared

Various technical papers on the subject have been read before numerous societies and the following methods of analysis have been adapted to the Analoid system —

- (a) The determination of where in mon, seed and aluminium alloys
- (b) The determination of phosphorus in iron, steel, basic slag, phosphor bronze, mineral phosphates, etc
- (c) The determination of manganese in iron, steel, slags, aluminium alloys, ferro-manganese, manganese bronze and ores
- (d) The determination of nickel, chromium, vanadium and molybdenum in iron, steel and ferro alloys
- (e) The determination of copper in commercial copper, brass, bronze, etc

- (f) The determination of lime in commercial lime, limestone cement, blast furnace, open hearth and cupola slags
- (g) The determination of the tin coating on tin plate and the zine coating on galvanised sheets
- (h) The determination of iron in non-ferrous materials, slags, iron ores, limestone, &c
- (i) The determination of Ni, Si, Cu, Mn, Fe and Ti in aluminium alloys
- Four million Analoids are used annually in about 600 metallurgical

BIBLIOGRAPHY

Journal Iron & Steel Inst , 1911, Vol I, p 332

Proceedings of the Gleveland Institution of Engineers, Session 1911-12,

Proceedings of the Sheffield Society of Engineers & Metallurguts, Part II,

Proceedings of the Staffordshire Iron & Steel Institute, Session 1912-13 Proceedings of the West of Scotland Iron & Steel Institute, Session 1911-12

Proceedings of the Iron & Steel Institute, 1913, Vol I, p 437

Proceedings of the Cleveland Institution of Engineers, Feb., 1919 Proceedings of the Cleveland Institution of Engineers, Feb., 1920

Chemical News, 7th May, 1920, and 23rd June, 1922

Proceedings of the Iron & Steel Institute, 1926, Vol I, p 463

Photo Electric Methods of Metalhirgical Analysis by Haywood and Wood, published by Adam Hdger, Ltd., London

Analoid System of Analysis (1937) by N D Ridsdale, free on request from Ridsdale & Co Ltd 234 Marton Road, Middlesbrough, Yorks

INTERNATIONAL ATOMIC WEIGHTS (1947)

	bymbol	Atomic Weight		Symbol	Atomic Weight
Aluminium	Al	26 97	Molybdenum	Mo	95 95
Antimony	Sb	121 76	Neodymum	Nd	144 27
Argon	A	39 944	Neon	Ne	20 183
Arsenic	As	74 91	Nickel	Nı	58 69
Bartum	Ba	137 36	Nitrogen	N	14.008
Beryllium	Be	9.02	Osmium	Os	190 2
Bismuth	Bı	200 00	Oxygen	0	16 0000
Boron	В	16 8z	Palladium	Pd	106 7
Bromine	Br	79 916	Phosphorus	P	30 98
Cadmium	Cd	112 41	Platinum	Pt	195 23
Calcium	Ca	40 08	Potassium	K	39 096
Carbon	C	12 010	Praseodymium	Pr	140 92
Cerium	Če	140 13	Protactinium	Pa	231
Cæsium	Čs	132 91	Radium	Ra	226 05
Chlorine	ČÏ	35 457	Radon	Rn	222
Chromium	Cr.	52 01	Rhemum	Re	186 31
Cobalt	Č.	58 94	Rhodium	Rh	102 91
Columbium	Cb	92 91	Rubidium	Rъ	85 48
Copper	Cu	63 54	Ruthentum	Ru	101 7
Dysprostum		162 46	Samarium	Sm	150 43
Erbium	Ēŕ	167 2	Scandium	Sc	45 10
Europium	Eu	1520	Selenium	Se	78 96
Fluorine	F	10 00	Silicon	Sı	28 06
Gadolinium	Gd	1569	Silver	Ag	107 880
Gallium	Ga	69 72	Sodium	Na	22 997
Germanuum	Ge	72 60	Strontium	Sr	87 63
Gold	Au	197 2	Sulphur	S	32 066
Hafmum	Hf	1786	Tantalum	Ta	180 88
Helium	He	4 003	Tellurium	Te	127 61
Holmum	Ho	164 94	Terbium	ТЪ	1592
Hydrogen	H	1 0080	Thallium	Tl	204 39
Indum	In	114 76	Thorium	Th	232 12
Iodine	I	126 92	Thulium	Tm	1694
Indum	Ιr	193 I	Tin	Sn	118 70
Iron	Fe	55 85	Titanium	Ti	47 90
Krypton	Kr	83 7	Tungsten	W	183 92
Lanthanum		138 92	Uranium	Ŭ	238 07
Lead	РЬ	207 21	Vanadium	v	50-95
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